Appendix C

Draft Clean Water Act Section 404(b)(1) Guidelines Evaluation for the Haile Gold Mine Project

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List of Acronyms

BOD	biological oxygen demand
CFR	Code of Federal Regulations
CWA	Clean Water Act
DO	dissolved oxygen
EIS	Environmental Impact Statement
ESA	Endangered Species Act
Guidelines	Section 404(b)(1) Guidelines
Haile Gold Mine, Inc.	Haile, the Applicant
µm	micrometers
NEPA	National Environmental Policy Act
NTU	nephelometric turbidity unit
NWR	National Wildlife Refuge
proposed Project	proposed Haile Gold Mine Project
RFFAs	reasonably foreseeable future actions
SCDHEC	South Carolina Department of Health and Environmental Control
SCDNR	South Carolina Department of Natural Resources
TSS	total suspended solids
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USACE	U.S. Army Corps of Engineers

1. INTRODUCTION

As part of its permitting decision regarding the Haile Gold Mine Project (the proposed Project), the U.S. Army Corps of Engineers (USACE) must evaluate the compliance of the proposed Project with the Section 404(b)(1) Guidelines (Guidelines).[1] This document constitutes a draft evaluation of the Haile Gold Mine Project's compliance with the Guidelines. This document has been prepared to serve two primary purposes:

- To present the preliminary information that ultimately will be used as part of the USACE's 404(b)(1) compliance determination and decision-making process regarding the proposed Haile Gold Mine Project; and

- To inform the public of the USACE decision-making process with respect to the 404(b)(1) compliance evaluation of the Haile Gold Mine Project and to invite the public to participate and provide comments relevant to that evaluation.

Notably, this draft Guidelines evaluation is based on the information contained in the Draft Environmental Impact Statement (Draft EIS) and supporting studies and reports, and is provided for information. The complete Draft EIS and its appendices are available for review at www.hailegoldmineeis.com. The USACE will not finalize its Guidelines compliance determination regarding the Haile Gold Mine Project Department of Army (DA) permit application until after the public has had an opportunity to comment on the Draft EIS and the USACE has published a Final EIS. After the USACE has published the Final EIS, a Record of Decision (ROD) will be issued describing the USACE's decision on the DA permit application and its determination of whether the Haile Gold Mine Project complies with the Guidelines.

1.1 Applicant's Proposed Project

Haile Gold Mine, Inc. (Haile), a subsidiary of Romarco Minerals, Inc., has proposed to reactivate mining operations at the Haile Gold Mine site, approximately 3 miles north of the town of Kershaw, in Lancaster County, South Carolina. Haile would expand the existing mine area for open-pit mining and would construct associated facilities to process ore and produce gold for sale.

The proposed Project would result in a discharge of dredge and fill material into waters of the United States. Section 404 of the Clean Water Act (CWA) establishes a regulatory program to regulate the discharge of dredge and fill material into waters of the United States, including wetlands, through issuance of DA permits.

1.2 Project Background

The proposed Project consists of opening new mine pits on a previous gold mine site and processing available reserves to extract gold and other associated precious metals from the ore. The Haile Gold Mine would consist of the sequential mining of open pits to produce 7,000 tons of ore per day, 365 days per year for processing. The mine plan (Figure 1) consists of eight open pits that would be mined over a period of approximately 12 years. Because the mine pits must be dry during mining, the groundwater table would be lowered to dewater the pits.

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[1] 40 CFR 230. The Section 404(b)(1) Guidelines, prepared by U.S. Environmental Protection Agency, are the substantive criteria used by the USACE for evaluation of a Section 404 permit.

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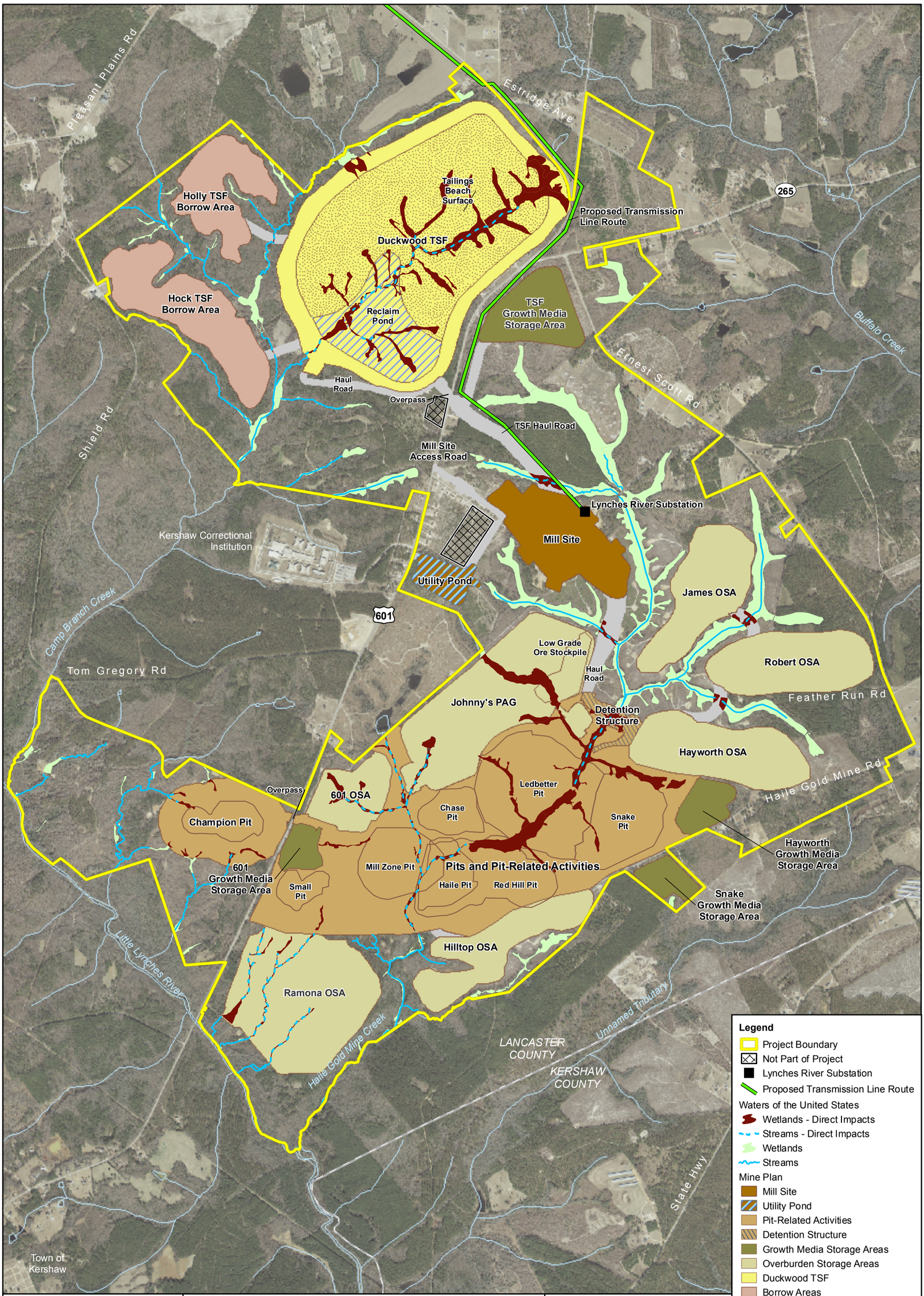

Haile Gold Mine Environmental Impact Statement
www.HaileGoldMineEIS.com

Figure C-1

Proposed Haile Gold Mine Project Mine Plan and Facilities

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An ore processing Mill would be constructed to extract and refine gold; the Mill would be supported by associated storage, warehouse, maintenance, water treatment, and administrative facilities. Tailings from the Mill would be piped in a slurry to the Duckwood Tailings Storage Facility (TSF), a lined facility capable of storing up to approximately 40 million tons of spent ore from the Mill.

Topsoil and near-surface overburden (also referred to as *growth media*) would be removed and stored for later use during the reclamation process. Overburden soil and rock that overlies the ore would be removed and stored in six overburden storage areas (OSAs), one of which would be reserved and specially constructed for storage of overburden with the potential to generate acid rock drainage.

All mine areas would be reclaimed under a State-approved reclamation plan. The OSAs would be concurrently reclaimed during mining as they reach their design capacity. Four of the mine pits would be fully backfilled with overburden and concurrently reclaimed as the ore has been extracted. Three pits, Ledbetter, Small, and Champion, would not be backfilled or would be partially backfilled; these pits eventually would fill with groundwater and runoff to become pit lakes.

1.2.1 Project Area

The Haile Gold Mine site is located 3 miles northeast of the town of Kershaw in southern Lancaster County, South Carolina (Figure 2). Lancaster County lies in the north-central part of the state. The Haile Gold Mine site is approximately 17 miles southeast of the city of Lancaster, the county seat, which is approximately 30 miles south of Charlotte, North Carolina. It is also approximately 50 miles northeast of Columbia, South Carolina. The approximate geographic center of the property is at 34° 34’ 46” N latitude and 80° 32’ 37” W longitude (M3 Engineering & Technology Corporation 2010).

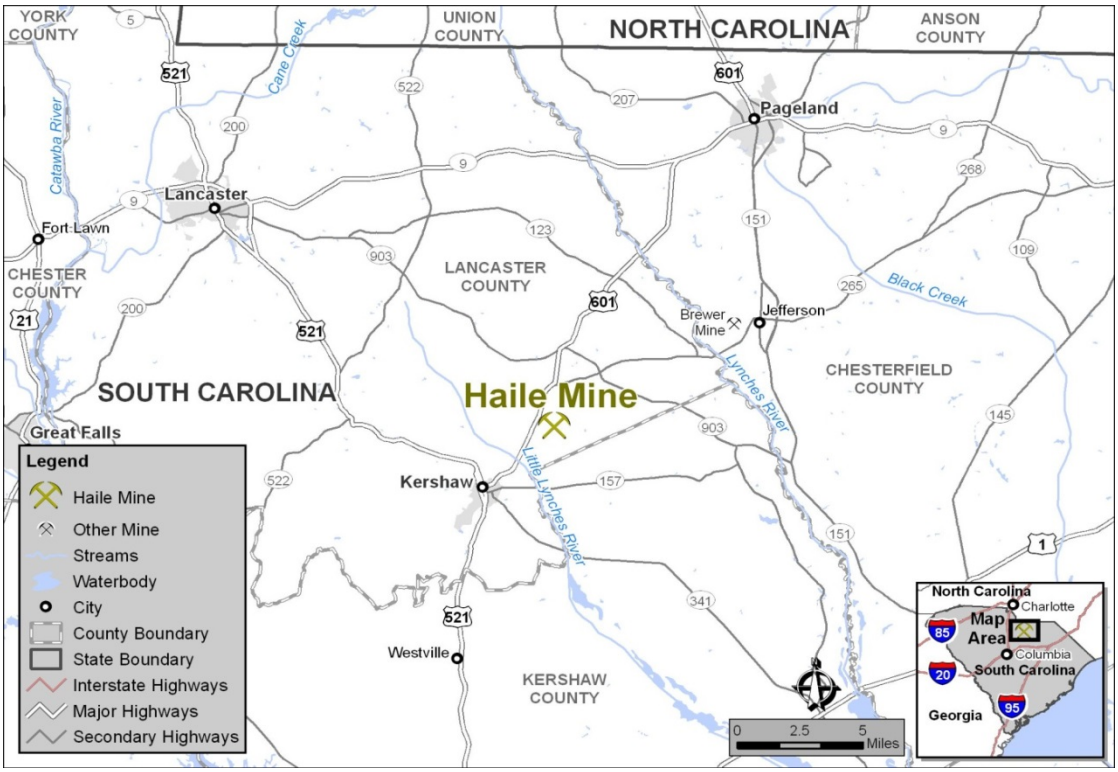

Figure C-2 Location of the Proposed Haile Gold Mine Project

The Project boundary encompasses a total of 4,552 acres, of which approximately 2,612[2] acres would be used for Project features. The Project area includes the land inside of the Project boundary, with the exception of two land parcels that are not owned by Haile, as shown in Figure 1.

The climate in the Project area is heavily influenced by the proximity of the Atlantic Ocean and the Appalachian Mountains (Tetra Tech 2012). The climate is described as subtropical; typically experiencing hot, humid summers and mild winters. July is the warmest month, with an average daily maximum temperature of approximately 90ºF and an average daily minimum temperature in the upper 60ºF range. The coolest month is January, with average daily maximum temperatures in the mid 50ºF range and average daily minimum temperatures in the upper 20ºF range (weather.com 2013). Precipitation is abundant throughout the year. The annual precipitation in the Project area is approximately 46 inches per year, and annual snowfall is typically less than 6 inches per year (Schlumberger Water Services 2011). In general, South Carolina averages 50 days of thunderstorm activity and 15 tornadoes annually (SCSCO 2013). The Project area is just outside of the hurricane susceptibility region designated by the Federal Emergency Management Agency (FEMA). Estimated wind speeds at the Project area could reach a maximum of approximately 200 miles per hour (mph) during an extreme wind event (tornado or hurricane) (FEMA 2010).

Haile Gold Mine is located almost entirely in the geographical region known as the Carolina Slate Belt; a small portion of the eastern side of the Project area lies within a geographical region known as the Sand Hills. Ten major soil types were identified in the Project area (NRCS 2011). Sediments of the Coastal Plains Sands (CPS) are concentrated on the east side of the Project area and are represented by relatively deep, unconsolidated (loose) sands of the Blaney, Blanton, Rutlege, Wagram, and Worsham soil series. Piedmont sediments are found on the west side of the Project area and include the Appling and Chesterfield, Chewacla, Herndon, Nason, Vaucluse, and Blaney soil series. The Piedmont soils found on the west side of the Project area are typically more susceptible to erosion by water. Further information on soils in the Project area is found in Section 3.2 of the Draft EIS.

The Project area is located in the headwater portion (origin) of the Lynches River watershed. In the upper reaches of the watershed, waterbody channels are incised a few feet from the floodplain and have little sinuosity (curves and bends). The lower reach of Haile Gold Mine Creek is incised into the landscape (saprolite in the Project area) by more than 5 feet in places, with increased channel sinuosity. The Project area is drained by Haile Gold Mine Creek and Camp Branch Creek. Haile Gold Mine Creek and Camp Branch Creek discharge to the Little Lynches River immediately south of the Project area; the Little Lynches River then discharges into the Lynches River. Further information on surface waters in the Project area is found in Section 3.4 of the Draft EIS.

As defined by the Natural Communities of South Carolina (Nelson 1986), 12 natural and modified vegetation types are within and in the vicinity of the Project area. Of these 12 vegetation types, four are natural communities (naturally occurring) and eight are non-natural communities that have been modified from natural communities by human presence and activities. Descriptions of vegetation types in the Project area are included in Section 3.8 of the Draft EIS.

Other land uses in the vicinity of the mine include residential, agricultural, and wetlands. Wetlands in the Project area have been mapped according to the Cowardin classification system and are classified as palustrine (forested wetland) and riverine (associated with waters of the United States). Descriptions of the types and extent of wetlands in the Project area are found in Section 3.6 of the Draft EIS.

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[2] The area estimated for Project features does not include the area of a disturbance buffer around the design footprint of each mine component (see Table A-1 in Appendix A of the Draft EIS).

Construction and operation of the proposed Project would directly affect approximately 120.46 acres of wetlands and open waters and 26,460.54 linear feet of streams.

1.3 The USACE Authority and Scope of Analysis

1.3.1 Section 404 of the Clean Water Act

Many activities that affect wetlands and waterbodies of the United States (U.S.) are subject to the jurisdiction of the USACE under Section 404 of the CWA and Section 10 of the Rivers and Harbors Act of 1899. Under Section 404 of the CWA, the USACE has authority to permit the discharge of dredged or fill material in waters of the U.S., and the authority to permit work and the placement of structures in navigable waters of the U.S. is delegated to the USACE under Section 10 of the Rivers and Harbors Act. The permit application evaluation requirements of Section 404 of the CWA are guidelines developed by the U.S. Environmental Protection Agency (USEPA) in conjunction with the USACE and codified in 40 CFR Part 230. Under Subpart B of the Section 404(b)(1) Guidelines, the USACE's evaluation of the Haile Gold Mine Project is required to address the following four tests the Project must meet in order to receive a Section 404 permit.

- **40 CFR 230.10 (a):** Whether there is a practicable alternative to the proposed discharge that would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences. The alternative identified by this test is referred to as the *least environmentally damaging practicable alternative* or the LEDPA. The evaluation of the proposed Haile Gold Mine Project with respect to this compliance test is found in Chapter 2, "Finding of Practicable Alternatives."
- **40 CFR 230.10 (b):** Whether the discharge would violate any applicable state water quality standards, Section 307 of the CWA, the Endangered Species Act (ESA), or federal laws concerning marine sanctuaries. The evaluation of the proposed Haile Gold Mine Project with respect to this compliance test is found in Chapter 3, "Restrictions on Discharge."
- **40 CFR 230.10 (c):** Whether the discharge would cause or contribute to significant degradation of waters of the U.S. The evaluation of the proposed Haile Gold Mine Project with respect to this compliance test is found in Chapter 4, "Finding of No Significant Degradation."
- **40 CFR 230.10 (d):** Whether appropriate and practicable steps have been taken that will minimize potential adverse impacts of the discharge on the aquatic ecosystem. The evaluation of the proposed Haile Gold Mine Project with respect to this compliance test is found in Chapter 5, "Minimization of Potential Adverse Impacts."

Evaluation of a proposed project under all four of the tests listed above constitutes a determination of compliance with the Guidelines. While making a compliance determination, the USACE may gather information sufficient to support and make its decisions by soliciting comments from other federal, tribal, state, and local resource agencies and the public. However, the USACE is solely responsible for reaching a decision on the merits of the permit application, including determination of the project purpose, the extent of the alternatives analysis, which alternatives are practicable, the LEDPA, the amount and type of mitigation that is to be required, and all other aspects of the decision-making process.

1.3.2 National Environmental Policy Act

Because the required permit authorization from the USACE is a major federal action, the USACE is the lead federal agency in preparation of an EIS required under the National Environmental Policy Act (NEPA). The USACE is being assisted in the NEPA process by three cooperating agencies: The South Carolina Department of Health and Environmental Control (SCDHEC), the USEPA, and the Catawba

Indian Nation. Responsibilities of the cooperating agencies include assisting the USACE in identifying issues of concern and providing meaningful and timely comment and input throughout the NEPA process.

According to the Guidelines, the NEPA alternative and impact analysis should provide sufficient information to evaluate compliance with the Guidelines. As stated in the Guidelines:

> *For actions subject to NEPA, where the Corps of Engineers is the permitting agency, the analysis of alternatives required for NEPA environmental documents, including supplemental Corps NEPA documents, will in most cases provide the information for the evaluation of alternatives under these Guidelines.*

Similarly, the USACE's Standard Operating Procedures for the USACE's Regulatory Program state that "Districts should not conduct or document separate alternatives analyses for NEPA and the 404(b)(1) Guidelines."

The USACE prepared the Draft EIS to meet the requirements of NEPA and the Guidelines under the USACE's regulatory program. Alternatives were developed to incorporate the LEDPA, and no additional alternatives will need to be developed as part of the USACE's Guidelines evaluation process. Notably, this draft Guidelines evaluation is not intended to replace any of the findings or conclusions in the Draft EIS. Rather, this draft Guidelines evaluation document builds on the alternatives and impact analysis developed within the Draft EIS, with a focus on the specific decision-making framework required by the Guidelines.

Because the Draft EIS was developed within the context of the 404(b)(1) evaluation process, this draft Guidelines evaluation relies on the findings and conclusions in the Draft EIS. For example, the Draft EIS establishes the range of reasonable alternatives to the Applicant's proposed Project. These alternatives provide a starting point for the USACE's practicability analysis under the Guidelines. The Draft EIS also analyzes the potential direct, indirect, and cumulative impacts associated with the Haile Gold Mine Project under each of the Draft EIS action alternatives. This analysis serves as the starting point for the USACE's evaluation of the impact of alternatives and alternative components on waters of the U.S. and special aquatic sites. Information from the Draft EIS is incorporated extensively into this draft Guidelines evaluation both by reference and by direct use of information contained therein.

2. FINDING OF PRACTICABLE ALTERNATIVES (40 CFR 230.10 [a])

The first compliance test of the Guidelines states that:

> *Except as provided under Section 404(b)(2), no discharge of dredged or fill material shall be permitted if there is a practicable alternative to the proposed discharge which would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences.*

The Guidelines define a *practicable alternative* as one that is "available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes" (40 CFR 230.10 [a][2]). This chapter forms the basis of the USACE's analysis of practicable alternatives for the Guidelines evaluation.

The first compliance test of the Guidelines establishes two presumptions that must be rebutted if a proposed project would affect special aquatic sites[3] and waters of the U.S. First, the Guidelines state that, when an activity associated with the discharge of dredged or fill material in a special aquatic site does not require access or proximity to that special aquatic site to fulfill its basic purpose, the activity is not "water dependent" and practicable alternatives that do not include impacts on special aquatic sites are presumed to exist unless clearly demonstrated otherwise. Second, the Guidelines establish that all practicable alternatives to the proposed discharge not involving a discharge into a special aquatic site are presumed to have less adverse impact on the aquatic ecosystem unless clearly demonstrated otherwise. The evaluation of the water dependency of the Haile Gold Mine Project and the availability of practicable alternatives that do not involve special aquatic sites is discussed in Section 2.1.2.

After evaluating the water dependency of a proposed project, the USACE must then consider the full range of practicable alternatives that are capable of achieving the overall project purpose. The overall project purpose of the Haile Gold Mine Project, as defined by the USACE, is discussed in Section 2.1.3. According to the Guidelines, the USACE's consideration of practicable alternatives also should consider:

i. Activities which do not involve a discharge of dredged or fill materials into waters of the U.S. or ocean waters; and

ii. Discharges of dredged or fill material at other locations in waters of the U.S. or ocean waters.

The evaluation of practicable alternatives in this chapter is based on the range of reasonable alternatives developed through the Draft EIS alternatives development process. As discussed above, the Draft EIS alternatives development process was implemented in a manner cognizant of the requirements of the Guidelines such that the range of reasonable alternative identified for the Draft EIS can provide a starting point for the USACE's practicability analysis under the Guidelines. Thus, Draft EIS alternatives form the basis from which the USACE will identify practicable alternatives and determine whether the Applicant's proposed Project is the least environmentally damaging practicable alternative (the LEDPA). The Draft EIS alternatives are discussed in Section 2.3. Section 2.4 discusses the practicability analysis methods.

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[3] *Special aquatic sites* are geographic areas, large or small, possessing special ecological characteristics of productivity, habitat, wildlife protection, or other important and easily disrupted ecological values. These areas are generally recognized as significantly influencing or positively contributing to the general overall environmental health or vitality of the entire ecosystem of a region (40 CFR 230.3).These include wetlands, sanctuaries and refuges, mudflats, vegetated shallows, coral reefs, and riffle and pool complexes.

2.1 Project Purpose

Establishing the underlying purpose and need for a project is a key step in evaluating compliance with the Guidelines. USACE regulations[4] define three ways of stating the purpose of a project. As described below, one statement is provided by the applicant, and the other two are determined by the USACE:

- The Applicant included a stated purpose and need in the application to the USACE for a DA permit.
- The USACE determines the "basic" purpose of the project, which is used to determine whether the project is water dependent under Section 404(b)(1) of the CWA.
- The USACE determines the "overall" purpose of the project, which is used to determine the range of practicable alternatives to the proposed project to be considered during preparation of an EIS.

These three statements of the Project purpose and need form the basis by which the USACE will evaluate compliance of the Project with the Guidelines; they also were used as part of identifying the Project purpose for the NEPA process. Although the three statements were developed to meet distinct objectives within the USACE's evaluation of compliance with the Guidelines, they may overlap to some extent.

2.1.1 Applicant's Stated Purpose and Need

The applicant's stated purpose and need is an expression, typically in the applicant's own words, of the underlying goals for a proposed project. The USACE takes an applicant's purpose and need into account when determining the USACE's overall purpose.

Haile has stated that the purpose of the Project is:

> *To produce gold for sale from the mineralized gold-bearing zones on the Haile property* (Haile 2012a).

Haile's stated need for the Project is to provide for increased domestic gold production to meet world demand. Haile has presented information demonstrating that gold is an important precious metal used worldwide for jewelry, currency/bullion, electronics, and medical purposes—and that gold demand has continued to increase in recent years, with stable prices allowing for profitable operations (Genesis Consulting Group 2011).

2.1.2 The USACE's Basic Project Purpose and Determination of Water Dependency

The Guidelines[5] require that the USACE determine whether a project is water dependent. *Water dependent* means that the project by its very nature requires access or proximity to, or siting within, a special aquatic site[6] to fulfill its "basic purpose."

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4 33 CFR 325, Appendix B, *NEPA Implementation Procedures for the Regulatory Program*; 40 CFR 230.10(a).

5 The Section 404(b)(1) Guidelines constitute the substantive environmental criteria used in evaluating activities regulated under Section 404 of the Clean Water Act.

6 *Special aquatic sites* include six categories identified by the U.S. Environmental Protection Agency in Section 404 of the Clean Water Act, including sanctuaries and refuges, wetlands, mudflats, vegetated shallows, coral reefs, and riffle and pool complexes.

If a project is determined not to be water dependent, the guidelines presume that

> *(1) "…practicable alternatives that do not involve special aquatic sites are presumed to be available, unless clearly demonstrated otherwise"; and (2) "…all practicable alternatives to the proposed discharge which do not involve a discharge into a special aquatic site are presumed to have less adverse impact on the aquatic ecosystem, unless clearly demonstrated otherwise."* (40 CFR 230.10 [a][3])

The regulations further require that the USACE alternatives analysis identifies the LEDPA.

The USACE has determined that the basic purpose of the Applicant's discharges of dredged or fill material is:

> *To extract and process gold.*

Extraction and processing of gold ore in and of itself does not require access or proximity to, or siting within, a special aquatic site to fulfill its "basic purpose." Therefore, the USACE has found that the Project is not water dependent (USACE 2011).

2.1.3 The USACE's Overall Project Purpose and Alternatives Analysis

Under NEPA regulations, alternatives to be evaluated in an EIS must be reasonable. The Guidelines also require evaluation of practicable alternatives. The USACE uses the overall project purpose to identify the range of potential alternatives that will be evaluated. If an alternative does not meet the applicant's need, as determined by the USACE, it may be rejected from further consideration.

The USACE regulatory guidelines state:

> *… The applicant's needs, and the type of project being proposed, should be considered. The overall project purpose should be specific enough to define the applicant's needs, but not so restrictive as to constrain the range of alternatives that must be considered under the 404(b)(1) guidelines.* (USACE 2009).

The USACE has determined that the overall Project purpose of the Haile Gold Mine Project is:

> *To open and operate a gold mining operation using gold-bearing mineral reserves in the Carolina Slate Belt region.*

While the Applicant more narrowly defined the Project purpose to the mineralized gold-bearing zones on the Haile property, the USACE must evaluate a broader geographic range in its alternatives analysis. As noted earlier, gold ore occurs throughout the Carolina Slate Belt in potentially mineable concentrations (USGS 2012a).

The Applicant has stated that full development of gold resources beyond the currently defined gold reserves may be considered in the future, although additional feasibility studies would be needed to provide the required definition of *probable* or *proven* gold reserves. The potential or likelihood of future development cannot be assessed until further delineation of ore reserves has been completed, as was done for the proposed Haile Gold Mine Project reserves.

2.2 Alternatives Development

Having established the basic and overall purposes of the Haile Gold Mine Project, the USACE then conducted an alternatives development process as part of the NEPA process and to initiate evaluation of the proposed Project under the first testing requirement of the Guidelines. As part of this process, the USACE and the cooperating agencies developed and evaluated a full range of alternatives in light of the overall Project purpose described in Section 2.1. The goal of this process was to consider the broadest range of possible alternatives and to identify the range of reasonable alternatives that could meet the overall Project purpose and that would advance for comparative analysis in the Draft EIS. The intent of the iterative process was to eliminate infeasible and unreasonable concepts and alternatives as early in the process as practical to allow the USACE and the cooperating agencies to focus on more feasible concepts and alternatives.

The range of reasonable alternatives identified by the USACE in the Draft EIS forms the starting point for the evaluation of practicable alternatives to the Applicant's proposed Project and determination whether the Applicant's proposed Project is the LEDPA. By examining the full scope of possible alternatives and then narrowing down potential alternatives to incorporate all reasonable alternatives into the Draft EIS, the USACE believes that it has captured all of the alternatives necessary to determine whether the Applicant's proposed Project is the LEDPA.

Furthermore, the USACE structured the Draft EIS development process to allow for consideration of alternative elements within the context of the Draft EIS alternatives (e.g. alternative ore processing methods, alternative mine plans). This provides the USACE with the flexibility to evaluate the existence of practicable alternative components to elements of the Applicant's proposed Project in the USACE's determination of whether the Applicant's proposed Project is the LEDPA.

The Draft EIS alternative development process is described in Sections 2.2.1 through 2.2.3 below.

2.2.1 Identification of Alternatives

The USACE identified potential alternatives to the Haile Gold Mine Project as proposed by the Applicant in a number of ways, as described in greater detail in Section 2.5.1 of the Draft EIS.

As a starting point for identification and evaluation of alternatives, any project site must have mineable gold reserves. Unlike commercial, residential, or industrial projects where site conditions do not require underlying mineral reserves, a mine must be located in an ore-rich environment that can support a significant capital investment. The ore must be located, explored, sampled, and evaluated thoroughly; and a feasibility study must be completed before extensive permitting and mining operations can begin. The Applicant's exploration in the Carolina Slate Belt region has included prospecting, sampling, mapping, drilling, and other activities involved in searching for ore, as summarized in Romarco's *2012 Annual Report* (Romarco 2013). Haile has stated that the proposed Haile Gold Mine represents the culmination of exploration, resource evaluation, feasibility, engineering design, and environmental studies completed by the Applicant over a period of 6 years. According to the Applicant, the Haile property was purchased by Romarco Minerals, Inc. in 2007 with a known gold resource of approximately 700,000 ounces at that time, based on prior exploration and mining. Given the cost of, and uncertainty in, gold exploration, the USACE determined that it would be neither reasonable nor practicable to require a search for alternative mine locations in areas with no known gold reserves. Therefore, geographic areas within the Carolina Slate Belt without known gold reserves do not meet the overall Project purpose and are neither reasonable nor practicable alternative locations.

The next logical step led the USACE to consider other existing or past gold mines in the Carolina Slate Belt region, because it is recognized that gold reserves and gold mining activity have occurred there.[7] It was determined that none of the existing or historical major mines in the Carolina Slate Belt region could be considered reasonable or practicable alternative mine sites. Therefore, the USACE then narrowed the range of alternatives to those occurring at the Haile Gold Mine site.

The USACE identified potential alternatives at the Haile Gold Mine site in a number of ways. The first was through the EIS public scoping process, when the USACE specifically solicited comments and suggestions about Project alternatives early in the EIS process. Alternatives also were identified through a detailed review of the alternatives analysis provided by the Applicant. The Applicant developed the proposed Project through a mine planning process that included exploratory drilling to determine the location, extent, and quality of mineralization; development of an industry-standard technical, logistical, and economic feasibility study by an independent consultant; and development of a mine plan to optimize extraction and processing of reserves. During this planning process, the Applicant evaluated a number of alternatives, with particular attention to the alternatives and locations for the TSF and OSAs. The mine planning and alternatives evaluation process was documented by the Applicant and was independently reviewed in detail during USACE's process of identifying and assessing potential alternatives (see Section 2.4 of the Draft EIS for additional details).

Finally, the USACE independently identified potential alternatives through a systematic evaluation of alternatives to the proposed Project, starting with the Project location and proceeding through each of the major Project elements.

The USACE evaluated a full range of alternatives to the major Project elements shown in Table 1-1 as the structure for the evaluation.

Table 1 Alternatives to Major Project Elements Considered by the USACE

Project Element	Alternatives Considered
Mine location	Mining gold deposits at other locations in the Carolina Slate Belt
Mining methods	Using methods other than open-pit mining to extract gold-bearing ore
Ore processing methods	Using methods other than the proposed milling and carbon-in-leach method
Mill Site	Locating the Mill Site at an alternative site
Overburden storage areas	Designing alternative locations and configuration for overburden storage
Tailings storage facilities	Locating tailings storage facilities at alternative sites and/or using different configurations for long-term tailings storage
Water management	Providing for alternative water supplies and water management systems
Roads	Routing and configuring access and haul roads at different locations within the mine site
Transmission lines	Routing transmission interconnections to the mine to a different alignment
Mine operating plans	Developing different scheme and schedules for mine development, operation, and reclamation

The USACE evaluated these Project elements to determine whether any reasonable alternatives could be identified that should be evaluated in detail in the Draft EIS. It should be noted that the requirement under Section 404(b)(1) to select the practicable alternative with the least adverse impact on the aquatic

[7] In addition, the USACE is unaware of any known gold reserves at previously unmined sites in the Carolina Slate Belt.

ecosystem also includes an important qualifier: "…so long as the alternative does not have other significant adverse environmental consequences."

The results of the alternatives evaluation are shown in Table 2-2. A more detailed analysis of each potential alternative Project element is provided in Chapter 2 of the Draft EIS.

Table 2 Summary Evaluation of Alternatives

Alternative	Findings	Conclusion
Alternative mine locations	The presence of gold ore reserves and gold ore resources has been established in the Carolina Slate Belt through exploration by a number of companies and agencies, including the Applicant. Gold mining must be located where gold ore reserves have been established. Establishing ore reserves requires a formal feasibility analysis prepared according to industry standards. No other gold reserves have been established in the Carolina Slate Belt region, and directing the Applicant to explore and establish reserves elsewhere is not reasonable or practicable.	Mining at a different location in the Carolina Slate Belt would not meet the overall Project purpose because reserves have not been established at a different location. This alternative does not meet the overall Project purpose and is not practicable.
Alternative mining methods	Two general methods of ore extraction are used for gold mining—open-pit mining and underground mining. Underground mining can be achieved with less surface disturbance and could reduce potential impacts on wetlands and other Waters of the U.S. Underground mining methods typically are used where the concentration of gold in the mineral-bearing ore is higher, and smaller volumes of ore can be extracted with underground mining methods to yield financially feasible quantities of gold. The gold ore concentrations at the Haile Gold Mine are well below the values generally accepted in the industry as being economical for underground mining methods. The open-pit method would be able to cost-effectively extract the reserves identified at the Haile Gold Mine, whereas underground mining would not be able to achieve the same full recovery of the established gold reserves. The location, depth, boundaries, and quality of the gold ore reserves are paramount in determining the optimal pit design—defined as the contour that is the result of optimizing the amount and quality of ore extracted for the volume of overburden while satisfying operational requirements and safe wall slopes. Together with other factors, the optimal pit design also maximizes profit for the established reserve. Given the ore reserves defined at the Haile Gold Mine, the pit optimization process largely minimizes the surface area disturbance needed to mine the ore reserve because moving any more than the minimum amount of overburden is financially disadvantageous. Alternative conceptual pit designs were considered to determine whether the ultimate footprint of the pits could be altered to reduce direct impacts on wetlands and other Waters of the U.S.	Alternative mining methods at the Haile Gold Mine would not meet the overall Project purpose and are not practicable for financial and technical reasons widely accepted in the gold mining industry. Larger pits would increase overburden storage requirements and would increase direct impacts on Waters of the U.S. Smaller pits could reduce some direct impacts on wetlands and other Waters of the U.S.; however, smaller pits with similar volume would reduce the recovery of gold reserves and would not meet the overall Project purpose. Smaller pits with steeper slopes designed to recover all of the recoverable reserves are not practicable because of unlikely and unknown technical feasibility (the safety of side walls and equipment constraints).

Table 2 Summary Evaluation of Alternatives (Continued)

Alternative	Findings	Conclusion
Alternative ore processing methods	Alternative ore processing methods were evaluated, including the tank processing method proposed by the Applicant, heap leaching, pressure oxidation, and concentrate roasting. Heap leaching was found to be less efficient at extracting gold, to increase direct impacts on Waters of the U.S because of greater land requirements, and to increase the risk of environmental exposure to cyanide. In addition, heap leaching is not suited to the humid climate. An alternative was examined in which the tailings stream would be differentiated and sulfur-bearing minerals segregated for storage in a separate TSF. The purpose of this alternative would be to reduce the overall sulfur-bearing content of the tailings and their potential for generating acid mine drainage. However, segregating the tailings would require partitioning the TSF or building a second TSF for the higher sulfur content tailings. Separating the tailings also would allow higher sulfur tailings to potentially be sold as a commercial product. Pressure oxidation would result in higher gold and silver recovery and neutralized sulfide minerals but would require building a processing facility and would increase net annual operating costs. The proposed TSF may need to be enlarged, causing an increase in the disturbed area footprint for the TSF. Concentrate roasting has been used infrequently in the U.S. and elsewhere. Gas emissions from the process would require treatment prior to release. The treatment equipment would substantially increase capital and operational costs, and the process would produce substantial quantities of sulfuric acid. Impacts on Waters of the U.S. could be similar to those of the proposed Project, depending on space requirements for the TSF.	Heap leaching would meet the overall Project purpose and is less expensive; the alternative is not environmentally preferable to the proposed tank processing method because greater land requirements would increase direct impacts on Waters of the U.S. Separation of the tailings stream would not meet the overall Project purpose. The alternative was found not to be practicable because there is no identified market for the high-sulfur content material, construction and operation of a partitioned TSF or construction of a separate TSF would increase Project costs, and potential enlargement of the TSF would likely increase direct impacts on Waters of the U.S. Pressure oxidation processing is not practicable because of increased costs; enlargement of the TSF would increase the disturbed area footprint and associated direct impacts. Concentrate roasting is not practicable because of increased costs, the technology is not proven, and it is not environmentally preferable to the proposed Project.
Alternative Mill Sites	The Mill Site, including the chemical storage area, water treatment plant, equipment maintenance shop, fueling station, and main offices, were co-located to increase operational efficiency and reduce the Project footprint. The central location close to the mine pits reduces traffic and safety risks related to hauling ore. The revised DA permit application (2012) included reconfiguration of the Mill Site, which eliminated direct impacts on Waters of the U.S. from this facility.	No alternative reconfiguration or relocation of the Mill Site was identified that could reduce direct impacts on Waters of the U.S.
Alternative overburden storage areas	A portion of the overburden material removed prior to and during the mining process would be permanently stored adjacent to the pits in large mounds. Three of the seven planned OSAs require filling of wetlands and streams. Reconfiguration or relocation of the OSAs was considered to reduce direct impacts on wetlands and streams. Relocating an OSA to undisturbed locations within the Project area was found not to reduce direct impacts; however, re-use of the Holly and Hock TSF borrow areas as a potential OSA was evaluated.	Use of the Holly and Hock TSF borrow areas for overburden storage may be practicable, may meet the overall Project purpose, and would reduce direct impacts on Waters of the U.S. This alternative will be carried forward for further analysis in the Draft EIS.

Table 2 Summary Evaluation of Alternatives (Continued)

Alternative	Findings	Conclusion
Alternative overburden storage areas (Continued)	Use of this location as an OSA would allow a reduction in the size of the Ramona OSA, which would reduce total direct impacts on wetlands by approximately 1.8% and total direct impacts on streams by approximately 26.8%.	
Alternative tailings storage and management	Twenty-one different locations of single 15- to 40-million-ton capacity or multiple 20-million-ton capacity TSF facilities were evaluated, in addition to placing processed tailings into finished pits as backfill as an alternative to building a TSF or reducing its size. A series of environmental impact and technical criteria were considered for each, and the results were evaluated in detail.	While certain alternative TSF sites may meet the overall Project purpose (TSF alternative Sites 7, 9, and 3A+11A) and would reduce direct impacts on Waters of the U.S., none of the alternative sites were considered practicable.
Water management alternatives	Management of water supply and contact water systems has been optimized by the Applicant based on the proposed ore processing system that includes significant water conservation measures. No alternative water management system was identified that would reduce the use of available water resources.	No alternatives were identified. Potential minimization or avoidance measures will be considered during the evaluation of impacts in the EIS.
Haul road alternatives	All roads within the Project area are directly associated with the location of specific facilities except the haul road between the Mill Site and the TSF. Any alternative routes for this road would increase its length and associated impacts.	No alternatives were identified. Potential minimization or avoidance measures will be considered during the evaluation of impacts in the EIS.
Transmission line route alternatives	A 69 kilovolt transmission interconnection would be constructed as a separate project by an electric utility. The suggested route would parallel an existing transmission line and highway. This is considered a connected action under NEPA.	No alternatives were identified, but the transmission line will be considered in the EIS environmental analysis as a connected action.
Alternative mine operation sequences	The Applicant's proposed sequence of mining operations is based on the location and grade of ore and the physical configuration of the ore body, in addition to other interrelated engineering, financial, logistical, and practical requirements and constraints. No alternative mine operation sequence was identified that would reduce impacts on Waters of the U.S.	No alternatives were identified.
Alternative Project configurations	A wide range of alternative configurations for the mine elements and their locations was considered during the alternatives analysis, with a primary design criterion of avoidance and minimization of direct impacts on Waters of the U.S. No alternate configuration was identified that would meet the overall Project purpose and reduce impacts on Waters of the U.S.	No alternatives were identified.

2.3 Alternatives Recommended for Further Analysis in the EIS

Based on information submitted by the Applicant as part of the application for a DA permit, and based on its own independent review, the USACE has completed the identification and evaluation of alternatives for the proposed Haile Gold Mine Project. The USACE has identified the following three alternatives for further analysis in the EIS:

- **Applicant's Proposed Project –** The Haile Gold Mine Project as proposed by the Applicant in the revised DA permit application dated August 15, 2012.
- **No Action Alternative –** The application for a DA permit would be denied; the proposed Project would not occur; the Applicant would continue to complete post-closure monitoring of the Haile Gold Mine site consistent with the previously issued South Carolina mine permit conditions; future suitable uses of the Project lands may occur.
- **Modified Project Alternative –** A variation of the proposed Project with the Holly and Hock TSF borrow areas used as OSAs and commensurate reduction in the size of the Ramona OSA; other adjustments to the Project to avoid and minimize impacts.

2.4 Alternatives Practicability Analysis

Having established the range of reasonable alternatives through the Draft EIS alternatives development process, the USACE then must evaluate the practicability of the alternatives to determine whether a practicable alternative to the Applicant's proposed Project exists that "would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences." (40 CFR 230.10[a])

To make this determination, the USACE will evaluate the Draft EIS alternatives and alternative components using the definition of practicability established by the Guidelines. As discussed in Section 2.2, "Alternatives Development," the USACE believes that it has captured all of the reasonable alternatives and components necessary to determine whether the Applicant's proposed Project is the LEDPA. The evaluation of detailed component alternatives within the Draft EIS alternatives also provides the USACE with additional flexibility to ensure that the full extent of practicable alternatives is considered when determining whether the Applicant's proposed Project is the LEDPA among all of the alternatives identified as practicable. The USACE may issue a permit for the Applicant's proposed Project only if it is found to be the LEDPA.

The practicability analysis being conducted by the USACE is not intended to alter the conclusions reached by the Draft EIS for the NEPA process, nor need it incorporate alternatives or alternative components that were eliminated from consideration as part of the alternatives development process in the Draft EIS. Rather, the purpose of the practicability analysis is to supplement the information and findings presented in the Draft EIS, to meet the needs of the alternatives analysis requirements of the Guidelines.

The discussion in this section provides the methods by which the USACE ultimately will determine the practicability of the Draft EIS alternatives. At this point in time, the USACE considers all Draft EIS alternatives and alternative components to be practicable, and the USACE will not make a final determination on practicability until the issuance of a ROD. The USACE invites the public to review the practicability analysis methods presented in this section. The USACE also solicits public comment on the practicability of the alternatives presented.

2.4.1 Practicability Analysis Methods

The Guidelines provide a two-fold definition of a practicable alternative:

1. A practicable alternative is one that is available and capable of being done after taking into consideration cost, existing technology, and logistics.

2. The three practicability criteria (cost, existing technology, and logistics) apply in light of the overall project purpose.

Thus, in order to be practicable, an alternative must not only meet the three practicability criteria but also must fulfill the overall project purpose. The overall purpose of the Haile Gold Mine, as described by the USACE is:

> *To open and operate a gold mining operation using gold-bearing mineral reserves in the Carolina Slate Belt region.*

As part of its practicability analysis, the USACE is working with the Applicant to evaluate the logistical and technological constraints associated with the Draft EIS alternatives. The Applicant can help identify key differences between the alternatives based on 2 years of engineering and planning related to the proposed Haile Gold Mine Project, experience in conducting exploratory drilling at the Haile Gold Mine site, and experience with mining projects.

In full compliance with NEPA guidelines, all information provided by the Applicant has been and will continue to be validated and verified by third-party reviewers.

At this point in time, the Applicant has completed extensive analyses on existing technology and logistics related to the practicability of the Draft EIS alternatives. Third-party reviews of the information provided by the Applicant are ongoing. These reviews will be incorporated into the USACE decision-making process and will be presented in the Final EIS for public consideration prior to the ROD. At this time, the USACE considers the three alternatives described in Section 2.3 to be practicable.

3. RESTRICTIONS ON DISCHARGE (40 CFR 230.10[b])

The second compliance test under the Guidelines considers specific impacts that may warrant additional restrictions on discharge. Specifically, the Guidelines state that no discharge of dredged or fill material may be permitted if it will:

1. Cause or contribute to violations of any applicable State water quality standard.

2. Violate any applicable toxic effluent standard or prohibition under Section 307 of the CWA.

3. Jeopardize the continued existence of species listed as endangered or threatened under the ESA of 1973, or result in the potential for adverse impacts (destruction or adverse modification) of a habitat which is determined by the Secretary of the Interior or Commerce to be a critical habitat under the ESA of 1973. If an exemption has been granted by the Endangered Species Committee, the terms of the exemption shall apply, in lieu of this paragraph.

4. Violate any requirement imposed by the Secretary of Commerce to protect any marine sanctuary designated under Title III of the Marine Protection, Research, and Sanctuaries Act of 1972.

If the proposed discharge is found to violate the standards or cause any of the adverse impacts listed above, the discharge may not be permitted.

The USACE has not yet made a determination regarding compliance of the Applicant's proposed Project with the restrictions on discharge test of the Guidelines. A determination of whether the proposed Project meets the standards listed above ultimately will be based on the findings outlined in this Guidelines evaluation document. The USACE invites the public to review the analysis of impacts found in the Draft EIS and herein. The USACE seeks public comment on the evaluation of compliance or non-compliance of the Applicant's proposed Project with the restrictions on discharge listed above.

4. FINDING OF NO SIGNIFICANT DEGRADATION (40 CFR 230.10[c])

The third compliance test under the Guidelines considers the potential for the proposed discharge to cause or contribute to the degradation of waters of the U.S. The Guidelines state that except as provided under Section 404(b)(2), the discharge of dredged or fill material that will cause or contribute to significant degradation of waters of the U.S. may not be permitted. The Guidelines further define the types of effects that may, either individually or collectively, contribute to the significant degradation of waters of the U.S. These include:

1. Significant adverse effects of discharge of pollutants on human health or welfare, through pollution of municipal water supplies, fish, shellfish, wildlife and special aquatic sites;

2. Significant adverse effects of discharge of pollutants on life stages of aquatic wildlife and other wildlife dependent on aquatic ecosystems, to include the transfer, concentration, and spread of pollutants or their byproducts outside of the disposal site through biological, physical, and/or chemical processes;

3. Significant adverse effects of discharge of pollutants on aquatic ecosystem diversity, productivity, and stability including but not limited to the loss of fish and wildlife habitat, or the loss of the capacity of wetland to assimilate nutrients, purify water, or reduce wave energy; and

4. Significant adverse effects of discharge of pollutants on recreational, aesthetic, and/or economic values.

At this time, the USACE has not yet made a determination of the compliance of the Applicant's proposed Project with the test of no significant degradation. The determination of whether the Applicant's proposed Project causes or contributes to significant degradation of waters of the U.S. will ultimately be based on the conclusions of the Factual Determinations (Subpart B) and the Evaluation of Dredged or Fill Material (Subpart G). The conclusions of these two Appendices also take into account the detailed analysis of impacts on specific physical, chemical, biological and human characteristics of the aquatic ecosystem found in Subparts C through F). The determination of compliance also will take into consideration the "Actions to Minimize Adverse Effects" found in Subpart H.

The USACE invites the public to review the analysis of impacts found in the Draft EIS and herein. The USACE seeks public comment on the evaluation of the compliance or non-compliance of the Applicant's proposed Project with the standards of no significant degradation outlined above.

5. MINIMIZATION OF POTENTIAL ADVERSE IMPACTS (40 CFR 230.10[d])

The fourth compliance test under the Guidelines considers the extent to which steps have been taken to minimize potential adverse effects. The Guidelines state that, except as provided under Section 404(b)(2), no discharge of dredged or fill material shall be permitted unless appropriate and practicable steps have been taken that will minimize potential adverse impacts of the discharge on the aquatic ecosystem.

At this time, the USACE has not yet made a determination of whether the Applicant's proposed Project complies with the test of minimization of potential adverse impacts. This determination ultimately will be based on the minimization measures identified in "Actions to Minimize Adverse Effects" (Subpart H).

The Applicant has identified several potential measures to minimize adverse impacts. These measures are outlined in the Applicant's revised DA permit application (Haile 2012b), Monitoring and Management Plan (Haile 2013a), Compensatory Mitigation Plan (Haile 2013b), and Reclamation Plan (Haile 2013c). Applicant-proposed minimization measures are summarized in Chapter 6, "Mitigation and Monitoring" in the Draft EIS. Resource-specific measures are identified in the respective sections of Chapter 4, "Environmental Consequences" in the Draft EIS. The above-referenced documents also are provided as appendices to the Draft EIS (available at: www.hailegoldmineeis.com).

The USACE has reviewed the minimization measures proposed by the Applicant and considers them to be a reasonable starting point for developing the list of all appropriate and practicable steps that can be taken to minimize the potential adverse impacts of the proposed Project. However, the USACE has not yet determined whether the Applicant's proposed minimization actions include all appropriate and practicable measures. The USACE invites the public to comment on the current list of Applicant-proposed minimization measures and to provide suggestions on additional avoidance and minimization measures that may be appropriate and practicable to reduce impacts on waters of the U.S. and aquatic ecosystems.

6. SUMMARY OF FINDINGS OF COMPLIANCE

This document constitutes a draft of the USACE's evaluation of the Haile Gold Mine Project's compliance with the Guidelines. This chapter ultimately will contain the USACE's findings of compliance based on Chapter 2, "Finding of Practicable Alternatives (40 CFR 230.10 [a])"; Chapter 3, "Restrictions on Discharge (40 CFR 230.10 [b])"; Chapter 4, "Finding of No Significant Degradation (40 CFR 230.10 [c])"; and Chapter 5, "Minimization of Potential Adverse Effects (40 CFR 230.10 [d])."

As discussed in Chapter 1, the USACE will not finalize its compliance determination regarding the Applicant's DA permit application until after the public has had an opportunity to comment on the Draft EIS and the USACE has published the Final EIS. At that time, the USACE will issue an ROD describing its decision on the permit application and its determination of whether the Applicant's proposed Project complies with the Guidelines.

7. SUBPART B: COMPLIANCE WITH THE GUIDELINES

7.1 Restrictions on Discharge (40 CFR 230.10)

The Guidelines state that no discharge of dredged or fill material may be permitted if it will.

1. Cause or contribute to violations of any applicable State water quality standard.

2. Violate any applicable toxic effluent standard or prohibition under Section 307 of the CWA.

3. Jeopardize the continued existence of species listed as endangered or threatened under the ESA of 1973, or result in the potential for adverse impacts (destruction or adverse modification) of a habitat which is determined by the Secretary of the Interior or Commerce to be a critical habitat under the ESA of 1973. If an exemption has been granted by the Endangered Species Committee, the terms of the exemption shall apply, in lieu of this paragraph.

4. Violate any requirement imposed by the Secretary of Commerce to protect any marine sanctuary designated under title III of the Marine Protection, Research, and Sanctuaries Act of 1972.

If the proposed discharge is found to violate the standards or cause any of the adverse impacts listed above, the discharge may not be permitted. At this time, the USACE has not yet made a determination of whether the Applicant's proposed Project complies with the test of no significant degradation.

The Guidelines state that, except as provided under Section 404(b)(2), the discharge of dredged or fill material that will cause or contribute to significant degradation of waters of the U.S. may not be permitted. The Guidelines further define the types of effects that may individually or collectively contribute to the significant degradation of waters of the U.S. These include:

1. Significant adverse effects of discharge of pollutants on human health or welfare, through pollution of municipal water supplies, fish, shellfish, wildlife and special aquatic sites;

2. Significant adverse effects of discharge of pollutants on life stages of aquatic wildlife and other wildlife dependent on aquatic ecosystems, to include the transfer, concentration, and spread of pollutants or their byproducts outside of the disposal site through biological, physical, and/or chemical processes;

3. Significant adverse effects of discharge of pollutants on aquatic ecosystem diversity, productivity, and stability including but not limited to the loss of fish and wildlife habitat, or the loss of the capacity of wetland to assimilate nutrients, purify water, or reduce wave energy; and

4. Significant adverse effects of discharge of pollutants on recreational, aesthetic, and/or economic values.

The Guidelines state that, except as provided under Section 404(b)(2), no discharge of dredged or fill material shall be permitted unless appropriate and practicable steps have been taken that will minimize the potential adverse impacts of the discharge on the aquatic ecosystem. At this time, the USACE has not

yet determined whether the Applicant's proposed Project complies with the test of no significant degradation.

The Guidelines consider the extent to which steps have been taken to minimize potential adverse effects. The Guidelines state that, except as provided under Section 404(b)(2), no discharge of dredged or fill material shall be permitted unless appropriate and practicable steps have been taken that will minimize potential adverse impacts of the discharge on the aquatic ecosystem. The Applicant has identified several potential measures to minimize adverse impacts. Applicant-proposed minimization measures are summarized in Chapter 6, "Mitigation and Monitoring" in the Draft EIS. Resource-specific measures are identified in the respective sections of Chapter 4, "Environmental Consequences" in the Draft EIS. The above-referenced documents also are provided as appendices to the Draft EIS (available at: www.hailegoldmineeis.com).

The USACE has reviewed the minimization measures proposed by the Applicant and considers them to be a reasonable starting point for developing the list of all appropriate and practicable steps that can be taken to minimize the potential adverse impacts of the proposed Project. However, the USACE has not yet determined whether the Applicant's proposed minimization actions include all appropriate and practicable measures. The USACE invites the public to comment on the current list of Applicant-proposed minimization measures and to provide suggestions on additional avoidance and minimization measures that may be appropriate and practicable to reduce impacts on waters of the U.S. and aquatic ecosystems. At this time, the USACE has not yet determined whether the Applicant's proposed Project complies with the test of minimization of potential adverse impacts.

The USACE has not yet made a determination regarding whether the Applicant's proposed Project complies with the restrictions on discharge test of the Guidelines. The USACE invites the public to review the analysis of impacts found in the Draft EIS and incorporated by reference into this Guidelines evaluation document. The USACE seeks public comment on the evaluation of the compliance or non-compliance of the Applicant's proposed Project with the restrictions on discharge listed above.

7.2 Factual Determinations (40 CFR 230.11)

7.2.1 Physical Substrate Determinations (40 CFR 230.11[a])

Physical substrate determinations include considering the effects of the proposed Project, individually and cumulatively, on the substrate in the study area.[8] Considerations include the physical characteristics of the material proposed for discharge; the material constituting the substrate at the disposal site; alterations in streamflow; and potential changes in substrate elevation and bottom contours, including changes outside of the disposal site that may occur as a result of erosion, compaction or other movement of the discharged material. The duration and physical extent of substrate changes also are considered.

Sections 3.2, "Geology and Soils"; 3.6, "Wetlands and Other Waters of the United States"; and 3.7, "Aquatic Resources" of the Draft EIS describe existing characteristics of the substrate in the Project area. A factual determination of impacts on substrate will be based on the impact analyses included in Sections 4.2, "Geology and Soils"; 4.6, "Wetlands and Other Waters of the United States"; and 4.7,

[8] Chapter 3 of the Draft EIS defines the study area for each of the 18 resources analyzed. For some resources, the study area is consistent with the Project area (the area within the Project boundary). For other resources (e.g., the water-related resources), the study area is larger than the Project area because potential effects extend beyond the Project boundary.

"Aquatic Resources" of the Draft EIS; findings of Subparts C through F; and "Actions to Minimize Adverse Effects" found in Subpart H.

7.2.2 Water Circulation, Fluctuation, and Salinity Determinations (40 CFR 230.11[b])

Water circulation, fluctuation, and salinity determinations include consideration of the effect of the proposed Project, individually and cumulatively, on freshwater circulation and current patterns in rivers, creeks, and streams in the study area. Consideration is given to the potential diversion or obstruction of flow; alterations of bottom contours; or other significant changes in the hydrologic regime such as alteration of the rate of groundwater inflows, surface runoff, and stream baseflow.

Sections 3.3, "Groundwater Hydrology and Water Quality" and 3.4, "Surface Water Hydrology and Water Quality" of the Draft EIS describe the existing freshwater hydrology, including freshwater circulation and current patterns in rivers, creeks, and streams in the study area and groundwater inflows. Information regarding the impacts of proposed Project activities on freshwater circulation and current patterns in the study area is found in Sections 4.3, Groundwater Hydrology and Water Quality" and 4.4, "Surface Water Hydrology and Water Quality" of the Draft EIS. A factual determination of impacts on water circulation, fluctuation, and salinity will be based on the technical evaluation factors findings in Subparts C through F, on the proposed actions for minimizing effects found in Subpart H, and the analysis of impacts in the Draft EIS.

7.2.3 Suspended Particulates and Turbidity Determinations (40 CFR 230.11[c])

Suspended particulates and turbidity determinations include considering the effect of the proposed Project, individually and cumulatively, on suspended particulates and turbidity in waters in the study area. Consideration is given to the physical characteristics of material proposed for discharge, the timing and duration of the discharge, the resulting turbidity plume, alterations in stream flows and water quality, and whether the potential changes would result in violations of applicable water quality standards. Section 3.4, "Surface Water Hydrology and Water Quality" describes existing characteristics of suspended particles and turbidity in the study area. A factual determination of impacts on suspended particles and turbidity will be based on the impact analyses in Section 4.4, "Surface Water Hydrology and Water Quality" of the Draft EIS, the findings of Subparts C, and the "Actions to Minimizing Adverse Effects" found in Subpart H.

7.2.4 Contaminant Determinations (40 CFR 230.11[d])

Hazardous waste and hazardous materials are defined as substances or industrial byproducts that are destructive to the environment, unsafe to handle, and harmful to humans and animals. Runoff from improperly stored, transported, or disposed of hazardous materials and waste can contaminate wetlands and other waters of the United States, contaminate groundwater, and harm wildlife. For the proposed Project, the acidity of the rock and soils, overburden, ore, and tailings processed and relocated during the mining process has the potential to contribute to discharge of contaminants and to generate acid mine drainage. The factual determinations within the Guidelines require a determination of the degree to which the material proposed for discharge could introduce, relocate, or increase contaminants. This determination considers the material to be discharged, the aquatic environment at the proposed disposal site, and the availability of contaminants.

Sections 3.19 and 4.19, "Hazardous Materials and Waste" of the Draft EIS provide information regarding the character of the materials proposed for discharge and the potential for contamination in the study area. The determination of the potential for contamination will be based on the analysis of impacts in

Section 4.19, "Hazardous Materials and Waste" of the Draft EIS, and on the evaluation of dredged and fill material conducted as part of the "Evaluation of Dredged or Fill Material" in Subpart G of this document.

7.2.5 Aquatic Ecosystems Structure and Function Determinations (40 CFR 230.11[e])

Determinations of aquatic ecosystem structure and function require consideration of potential changes in substrate characteristics and elevation, water quality, water circulation and fluctuations, and the potential effects of such changes on aquatic organisms or communities. The aquatic ecosystems in the study area support aquatic and wetland vegetation, fish, invertebrates, mammals, reptiles, amphibians, freshwater mussels, and birds. A determination of impacts on the structure and function of the aquatic ecosystem will be based on the impact analyses in Sections 4.2, "Geology and Soils"; 4.4, "Surface Water Hydrology and Water Quality"; 4.5, Water Supply and Floodplains"; 4.6, "Wetlands and Other Waters of the United States"; 4.7, "Aquatic Resources"; and 4.8, "Terrestrial Resources" of the Draft EIS. The factual determination of the potential effects of the discharge on aquatic ecosystems also may include information based on the "Evaluation of the Dredged or Fill Material" in Subpart G.

7.2.6 Proposed Disposal Site Determination (40 CFR 230.11[f])

The proposed disposal sites for dredged and fill materials are described in detail in Appendix A, "Detailed Project Description" of the Draft EIS and the Applicant's revised DA permit application (Haile 2012b). As part of the Applicant's proposed Project, fill materials would be placed in portions of streams, including headwaters; in slope and depressional wetland areas; and in existing lakes and ponds. Indirect impacts could result from diversion and detention of streams, reductions in runoff or stream baseflow, alteration of the existing flow regimes, alteration of the stream morphology or structure, and changes to water quality. Impacts from the proposed Project would result from construction of facilities, including roads, the TSF, and OSAs. The location of the proposed disposal sites for all action alternatives can be seen in Figures 1-5 and 2-1 of the Draft EIS.

The Guidelines state that the mixing zone associated with each specific disposal site shall be confined to the smallest practicable area consistent with the type of discharge dispersion. As part of this determination, the USACE must evaluate the acceptability of the proposed disposal sites and mixing zone based on the following factors:

- Depth of water at the disposal site;
- Current velocity, direction, and variability at the disposal site;
- Degree of turbulence;
- Stratification resulting from causes such as obstructions or salinity, or density profiles at the disposal site;
- Discharge vessel speed and direction, if appropriate;
- Rate of discharge;
- Ambient concentration of constituents of interest;
- Fill material characteristics, including concentrations of constituents, amount of material, type of material, and settling velocities;
- Number of discharge actions per unit time; and
- Other factors of the disposal site that affect the rates and patterns of mixing.

Sections 3.2, “Geology and Soils”; 3.4, “Surface Water Hydrology and Water Quality”; 3.5, “Water Supply and Floodplains”; 3.6, “Wetlands and Other Waters of the United States”; 3.7, “Aquatic Resources”; and 3.19 “Hazardous Materials and Waste” of the Draft EIS provide information regarding existing conditions at the proposed disposal sites. The factual determination of the proposed disposal sites will be based on the impact analyses found in Sections 4.2, “Geology and Soils”; 4.4, “Surface Water Hydrology and Water Quality”; 4.5, “Water Supply and Floodplains”; 4.6, “Wetlands and Other Waters of the United States”; 4.7, “Aquatic Resources”; and 4.19 “Hazardous Materials and Waste” of the Draft EIS. The factual determination also will be based on the findings of Subparts C and H.

7.2.7 Determination of Cumulative Effects on the Aquatic Ecosystem (40 CFR 230.11[g])

Cumulative effects on the aquatic ecosystem include changes that are attributable to the collective effect of activities associated with the proposed Project and other past, present, and reasonably foreseeable future actions (RFFAs) in the study area. The cumulative effect of numerous actions can result in a major impairment of the water resources and interfere with the productivity and water quality of existing aquatic ecosystems. Criteria used in identifying cumulatively affected resources include whether (1) the resource is especially vulnerable to incremental impacts; (2) other similar actions in the same geographic area may result in similar impacts on the resource; (3) impacts have been historically significant for the resource; and (4) cumulative impact concerns have been previously analyzed and identified. A determination of cumulative impacts that may result from the proposed Project should be evaluated to the extent reasonable and practical. A review of past, present, and RFFAs indicates that cumulative impacts would result primarily from changes to general economic drivers, mining, agriculture and forestry, urban and industrial development, and transportation.

See Chapter 5, “Cumulative Impacts” of the Draft EIS for a full list of past, present, and RFFAs in the study area. The determination of cumulative effects on the aquatic ecosystem will be based on these Draft EIS impact analyses, with consideration for impacts discussed in Subparts D and E.

7.2.8 Determination of Secondary Effects on the Aquatic Ecosystem (40 CFR 230.11[h])

In addition to direct impacts associated with the proposed Project, secondary effects may be experienced by wetlands and other waters of the United States from changes in hydrology, water quality, thermal regimes, and habitat. Project-related activities that alter hydrology to the extent that wetlands are no longer inundated or saturated at a frequency or duration sufficient to support hydrophytic vegetation would result in partial or permanent loss of wetland resources. The extent of impact associated with hydrologic changes depends on baseline conditions (e.g., hydrologic regimes, wetland types, soils, and geology), proximity to dewatering activities, and the duration of dewatering activities. As described in Section 3.6 of the Draft EIS, the wetlands in the Project area primarily consist of slope wetlands that are groundwater driven. Consequently, groundwater depressurization activities would lower the groundwater table and reduce baseflows, resulting in adverse impacts on hydrology and the overall health of the wetland systems and any receiving waterbodies (streams). Likewise, because the streams are fed by surface runoff and groundwater baseflows (from riparian slope wetlands), hydrologic impacts can be expected as a result of lowered groundwater and surface water alterations. Altered streamflow can affect residence time, reaeration rates, and kinetic rates that influence dissolved oxygen (DO), pH, and eutrophication in streams and wetlands. Introduction of Project-generated dust and contaminants also may result in secondary effects on wetlands and aquatic ecosystems. Disturbance of wildlife populations by noise or human activity also can result in changes to the biotic component of aquatic ecosystems.

Sections 4.2, “Geology and Soils”; 4.4, “Surface Water Hydrology and Water Quality”; 4.5, “Water Supply and Floodplains”; 4.6, “Wetlands and Other Waters of the United States”; 4.7, “Aquatic Resources”; and 4.8, “Terrestrial Resources” of the Draft EIS contain detailed analyses of potential secondary impacts on the aquatic ecosystem. The factual determination of secondary effects will be based on these impact analyses and on the analyses found in Subparts D and E.

8. SUBPART C: POTENTIAL IMPACTS ON PHYSICAL AND CHEMICAL CHARACTERISTICS OF THE AQUATIC ENVIRONMENT

8.1 Substrate (40 CFR 230.20)

The substrate of the aquatic ecosystem includes sediments that underlie open waters of the United States and hydric soils that constitute the surface of wetlands. Substrate consists of organic and inorganic solid materials, and includes water and other liquids or gases that occupy the pore space in the sediment or soil. Sections 3.2, "Geology and Soils"; 3.4, "Surface Water Hydrology and Water Quality; 3.6, "Wetlands and Other Waters of the United States"; and 3.7, "Aquatic Resources" of the Draft EIS describe the existing characteristics of the substrate in the Project area.

The substrate on which the proposed fill would be placed is located in the channels of streams, including headwaters, slope and depressional wetland areas, and existing lakes and ponds. The substrate of streams and wetlands in the Project area includes areas of cobble, gravel, sand, sand and gravel mix, silt, and clay. The substrate of slope wetland areas is Coastal Plains Sands which is a well-drained material. Loamy sands and fine sandy loams are found in depressions and floodplains and are very poorly drained soils with a low water capacity.

Potential Impacts

Potential Project-related impacts on substrate include direct impacts from filling of portions of streams, including headwaters, slope and depressional wetland areas, and existing lakes and ponds. Indirect impacts on substrate could result from diversion and detention of streams, reductions in runoff or stream baseflow, alteration of the existing flow regimes, alteration of the stream morphology or structure, and changes to water quality. Impacts on substrate from the proposed Project would result from construction of facilities, including roads, the TSF, and OSAs. The impact analyses in Sections 4.2, "Geology and Soils"; 4.4, "Surface Water Hydrology and Water Quality"; 4.6, "Wetlands and Other Waters of the United States"; and 4.7, "Aquatic Resources" of the Draft EIS will be incorporated into this document after the public has had an opportunity to comment on the Draft EIS and the USACE has published the Final EIS.

8.2 Suspended Particulates and Turbidity (40 CFR 230.21)

The amount of suspended solids with a diameter greater than 0.45 micrometers (µm) is quantified by the measurement of total suspended solids (TSS). Levels of TSS at the upper Camp Branch Creek stations and Haile Gold Mine Creek stations within and downstream of historical mining are higher relative to other sites in the study area. Section 3.4, "Surface Water Hydrology and Water Quality" of the Draft EIS describes the existing characteristics of suspended particles and turbidity in the study area. Turbidity provides a measurement of what is suspended in the water, and a limit of 50 NTU (nephelometric turbidity units) has been established by the State (SCDHEC 2012a).

There was little observed variability in turbidity levels in waters throughout the study area. Median turbidity levels were typically less than 10 NTU.

Potential Impacts

Project-related impacts on suspended particles and turbidity may occur during the entire life cycle of the mining process, including the post-closure phase. Impacts may occur from land disturbance activities, channel modifications and rerouting, effluent discharge from the contact water treatment plant, and management of overburden and tailings materials. Project-related impacts on suspended particles and turbidity could result from watershed alterations, additional loading of contaminants, water withdrawals and discharges, stormwater runoff, alteration of groundwater contributions, and clearing and industrial activity. These impacts are discussed in Section 4.4, "Surface Water Hydrology and Water Quality" of the Draft EIS. The impact analyses in the Draft EIS will be incorporated into this document after the public has had an opportunity to comment on the Draft EIS and the USACE has published the Final EIS.

8.3 Water Quality and Chemistry (40 CFR 230.22)

The characteristics that measure water quality include clarity; nutrient, metal, and chemical content; physical and biological content; dissolved gas levels; pH; and temperature. The study area lies within the larger Little Lynches River watershed. The SCDHEC monitors surface water quality at 14 stations within the Little Lynches River watershed. Aquatic life uses are fully supported at five of these stations. Nine stations are listed as impaired for parameters including copper, fecal coliform, pH, and poor macroinvertebrate scores. Changes in support use status show that water quality at four stations in the basin has improved from 1999 to 2003, while water quality at three stations (all on the Little Lynches River) has degraded. Improving trends at various stations include increased DO and decreased fecal coliform, total phosphorus, and BOD. Other trends at various stations include increased turbidity, total nitrogen, pH, and BOD and decreased pH. Section 3.4, "Surface Water Hydrology and Water Quality" of the Draft EIS describes the existing water quality characteristics of the study area.

Potential Impacts

Project-related impacts on water quality and chemistry may occur during the entire life of the mining process, including the post-closure phase. Impacts may result from land disturbance activities, groundwater lowering, channel modifications and rerouting, effluent discharge from the contact water treatment plant, management of overburden and tailings materials, and changes in water chemistry due to operations. Project-related impacts on water quality could result from watershed alterations, additional loading of nutrients or contaminants, water withdrawals and discharges, stormwater runoff, alteration of groundwater contributions, interaction with pit lakes and backfilled areas, and clearing and industrial activity. These impacts are discussed in Section 4.4, "Surface Water Hydrology and Water Quality" of the Draft EIS. The impact analyses in the Draft EIS will be incorporated into this document after the public has had an opportunity to comment on the Draft EIS and the USACE has published the Final EIS.

8.4 Water Circulation and Current Patterns (40 CFR 230.23)

Freshwater circulation in the study area is influenced by river drainages, smaller streams, and groundwater inflows. The study area is in the Little Lynches River watershed, encompassing nearly 127,000 acres in the Piedmont and Sand Hills regions. The watershed contains 257.5 stream miles and 171.9 acres of lakes, all designated by the SCDHEC as freshwater (FW). An impoundment is located in the upper Little Lynches River watershed near the Town of Kershaw.

The characteristics of streams and subwatersheds in the study area are similar to those in the larger Little Lynches River basin. Streams include Buffalo Creek, several unnamed tributaries to the Little Lynches River, Haile Gold Mine Creek, and Camp Branch Creek in its entirety. The highest average monthly

flows typically occur in January through March, while the lowest average monthly flows occur from June to September. Average annual total flow consists of approximately 63 percent baseflow and 37 percent runoff. Runoff flows are generally more variable than baseflows. Lower baseflows typically occur in summer and higher baseflows occur in winter. For the runoff component, the spectrum of observed flows is similar from month to month. Because total flows are primarily made up of the baseflow component, the distribution of total flow more closely matches that of the baseflow distribution (see Appendix J of the Draft EIS). Section 3.4, "Surface Water Hydrology and Water Quality" of the Draft EIS describes the existing freshwater circulation characteristics of the study area.

Potential Impacts

Project-related impacts on surface water hydrology, including freshwater circulation and current patterns, may occur during the entire life cycle of the mining process, including the post-closure phase. Impacts may be caused by land disturbance activities, groundwater lowering, channel modifications and rerouting, effluent discharge from the contact water treatment plant, and management of overburden and tailings materials.

Project-related impacts on freshwater circulation and current patterns could result from watershed alterations, water withdrawals and discharges, stormwater runoff, alteration of groundwater contributions, and clearing and industrial activity. These impacts are discussed in Section 4.4, "Surface Water Hydrology and Water Quality" of the Draft EIS. The impact analyses in the Draft EIS will be incorporated into this document after the public has had an opportunity to comment on the Draft EIS and the USACE has published the Final EIS.

8.5 Alteration of Normal Fluctuations (40 CFR 230.24)

Natural water fluctuations in an aquatic ecosystem consist of daily, seasonal, and annual flood fluctuations in water level. Sections 3.4, "Surface Water Hydrology and Water Quality"; and 3.5, "Water Supply and Floodplains" of the Draft EIS describe the existing freshwater fluctuations in the study area. The estimated 100-year flood event in the Little Lynches River, immediately downstream of the Project area tributaries, is approximately 8,300 cubic feet per second (ERC 2013). At this flow, the water surface elevation is estimated to be more than 4 feet lower than the surface elevation of all mining activities in the Project area (ERC 2013).

Potential Impacts

The analysis of impacts related to normal water fluctuations will include consideration of changes to the daily, seasonal, and annual water-level fluctuation pattern of an area and the effects of prolonged periods of inundation; exaggerated extremes of high and low water; or static, non-fluctuating water levels. Water level modifications may alter erosion or sedimentation rates, aggravate water temperature extremes, and alter the nutrient and DO balance of the aquatic ecosystem. In addition, water level modifications may alter aquatic and wetland habitats.

Sections 4.4, "Surface Water Hydrology and Water Quality"; and 4.5, "Water Supply and Floodplains" of the Draft EIS describe the potential impacts of Project infrastructure on water fluctuations. The impact analyses in the Draft EIS will be incorporated into this document after the public has had an opportunity to comment on the Draft EIS and the USACE has published the Final EIS.

8.6 Salinity Gradients (40 CFR 230.25)

Salinity gradients form where saltwater from the ocean meets and mixes with freshwater from land. Because there are no marine or estuarine environments in the Project area, there are no salinity gradients in the study area.

9. SUBPART D: POTENTIAL IMPACTS ON THE BIOLOGICAL CHARACTERISTICS OF THE AQUATIC ECOSYSTEM

9.1 Threatened and Endangered Species (40 CFR 230.30)

Federally listed species include those species listed as threatened, endangered, or candidate by the U.S. Fish and Wildlife Service (USFWS) under the ESA. *Endangered species* include any species that is in danger of extinction throughout all or a significant portion of its range. *Threatened species* indicate any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. *Candidate species* are plant and animal taxa considered for possible addition to the List of Endangered and Threatened Species. For these taxa, the USFWS has on file sufficient information on biological vulnerability and threat(s) to support issuance of a proposal to list, but issuance of a proposed rule is currently precluded by higher priority listing actions.

Threatened and endangered species that may be affected by the proposed Project are described in Section 3.9, "Federally Listed Species" of the Draft EIS. Threatened and endangered species known to occur in Lancaster County, South Carolina as of March 13, 2012, (USFWS 2012) include the following:

- Carolina heelsplitter (*Lasmigona decorata*) – federally listed as endangered
- Pool sprite (*Amphianthus pusillus*) – federally listed as threatened
- Smooth coneflower (*Echinacea laevigata*) – federally listed as endangered
- Schweinitz's sunflower (*Helianthus schweinitzii*) – federally listed as endangered
- Black-spored quillwort (*Isoetes melanospora*) – federally listed as endangered

Red-cockaded woodpecker (*Picoides borealis*), a species federally and state listed as endangered, has been reported in adjacent counties but is not on the Lancaster County list of threatened and endangered species.

Potential Impacts

Section 4.9, "Federally Listed Species" of the Draft EIS discusses potential impacts on threatened and endangered species in the Project area. The impact analyses in the Draft EIS will be incorporated into this document after the public has had an opportunity to comment on the Draft EIS and the USACE has published the Final EIS.

9.2 Aquatic Food Web (40 CFR 230.31)

The aquatic food web includes the current physical environment (streamflow, stream bottom composition, stream width, and riparian vegetation) and the associated biological assemblages or communities (the species composition) of various waterbodies within the resource study area. Biological assemblages consist of:

- Fish;
- Benthic macroinvertebrates – animals without backbones larger than 0.5 millimeter that live on the bottom of a waterbody;
- Freshwater mussels;

- Amphibians and reptiles;
- Aquatic vegetation; and
- Aquatic periphyton – algae, cyanobacteria, microbes, or detritus attached to submerged surfaces that serve as food sources to aquatic animals.

Additional discussion of waterbodies within the study area and the surrounding watersheds can be found in Sections 3.1, "Introduction to the Affected Environment"; 3.3 and 4.3, "Groundwater Hydrology and Water Quality"; 3.4 and 4.4, "Surface Water Hydrology and Water Quality"; 3.6 and 4.6, "Wetlands and Other Waters of the United States"; and 3.7 and 4.7, "Aquatic Resources" in the Draft EIS.

Potential Impacts

Potential Project-related impacts on aquatic resources include direct and indirect impacts caused by filling of portions of streams, including headwaters, slope and depressional wetlands, and existing lakes and ponds; diversion and detention of Haile Gold Mine Creek; reductions in runoff or stream baseflow; alteration of the existing flow regimes; alteration of the stream morphology or structure; stream diversions (e.g., culverts and pipes); draining or filling of existing lakes and ponds; and changes to water quality.

In areas where streams would be filled, direct habitat loss for aquatic species may occur, in addition to alterations in downstream flow and associated stream morphological features. The proposed detention structure and diversion of Haile Gold Mine Creek would affect the flow regime and stream connectivity. Construction of the TSF would permanently fill and alter portions of upper Camp Branch Creek. The TSF also would result in flow regime changes through a reduction in the contributing watershed area during mining. Construction of the Ramona OSA would permanently fill and alter portions of three unnamed tributaries draining to the Little Lynches River. Section 4.7, "Aquatic Resources" of the Draft EIS discusses potential impacts on aquatic ecosystems and organisms in the study area. The impact analyses in the Draft EIS will be incorporated into this document after the public has had an opportunity to comment on the Draft EIS and the USACE has published the Final EIS.

9.3 Other Wildlife (40 CFR 230.32)

Wildlife associated with aquatic ecosystems includes resident and transient mammals and birds. Section 3.8, "Terrestrial Resources" of the Draft EIS describes other wildlife present in the study area.

9.3.1 Birds

Forty-nine species of birds have been observed in the study area. Carolina wren (*Thryothorus ludovicianus),* American crow (*Corvus brachyrhynchos*), and northern cardinal (*Cardinalis cardinalis*) were the dominant species over the study area. The remaining top 10 species in decreasing order were tufted titmouse (*Baeolophus bicolor*), Carolina chickadee (*Picoides carolinensis*), eastern towhee (*Pipilo erythrophtalmus*), mourning dove (*Zenaida macroura*), blue jay (*Cyanocitta cristata*), white-eyed vireo (*Vireo griseus*), and yellow-billed cuckoo (*Coccyzus americanus*). Raptors and other large birds observed on the site include black vulture (*Coragyps atratus*), great blue heron (*Ardea herodias*), red-shouldered hawk (*Buteo lineatus*), turkey vulture (*Cathartes aura*), and wild turkey (*Meleagris gallopavo).*

9.3.2 Mammals

Evidence of feral hog (*Sus scrofa*); white-tailed deer (*Odocoileus virginianus*); coyote (*Canis latrans*); bobcat (*Lynx rufus*); beaver (*Castor canadensis*); raccoon (*Proycon lotor*); muskrat (*Ondatra zibethicus*); possum (*Didelphis marsupialis*); unidentified squirrel (family Sciuridae); unidentified rodent, mole, or vole; and Eastern cottontail rabbit (*Sylvilagus floridanus*) has been observed in the study area. In addition, hispid cotton rat (*Sigmodon hispidus*) and river otter (*Lutra canadensis*) were observed during 1993 field work in the area (Needham, Jernigan, & Associates 1993). No special-status species were observed in the area during those surveys or the other biological field surveys conducted during the various studies from 1993 to 2012 (Needham, Jernigan, & Associates 1993; NEI 2010; ARCADIS 2012a).

Potential Impacts

Key issues of concern for terrestrial wildlife include (1) the potential for habitat loss and habitat fragmentation (the division of large, contiguous blocks of habitat into smaller, more isolated parcels that are less suitable for wildlife) associated with removal of vegetation; and (2) potential mortality of wildlife during initial clearing, along access roads, and in pit lakes and tailings storage facilities. Habitat loss and fragmentation may extend beyond the areas directly disturbed within the Project boundary to include some additional area in the vicinity of the Project boundary where noise and other human activity could decrease the suitability of the area.

Impacts on other wildlife are discussed in Section 4.8, “Terrestrial Resources” of the Draft EIS. The impact analyses in the Draft EIS will be incorporated into this document after the public has had an opportunity to comment on the Draft EIS and the USACE has published the Final EIS.

10. SUBPART E: POTENTIAL IMPACTS ON SPECIAL AQUATIC SITES

Special aquatic sites are geographic areas, large or small, possessing special ecological characteristics of productivity, habitat, wildlife protection, or other important and easily disrupted ecological values. These areas are generally recognized as significantly influencing or positively contributing to the general overall environmental health or vitality of the entire ecosystem of a region (see 40 CFR 230.10[a][3]).

10.1 Sanctuaries and Refuges (40 CFR 230.40)

Sanctuaries and refuges consist of areas designated under state or federal laws or local ordinances to be managed principally for the preservation and use of fish and wildlife resources. The Forty Acre Rock Heritage Preserve and Wildlife Management Area, located approximately 1 mile north of the northern tip of the study area, is managed by the South Carolina Department of Natural Resources (SCDNR) and is designated as a National Natural Landmark (SCDNR 2007). The 45,348-acre Carolina Sandhills National Wildlife Refuge (NWR) is located approximately 10 miles east of the Project in Chesterfield County, South Carolina.

Potential Impacts

The analysis of impacts related to sanctuaries and refuges in the study area includes consideration of disruption of the breeding, spawning, migratory movements, or other critical life requirements of resident or transient fish and wildlife; creation of easy and incompatible human access to remote aquatic areas; creation of the need for frequent maintenance activity; establishment of undesirable competitive species of plants and animals; changes in the balance of water and land areas needed to provide cover, food, and other fish and wildlife habitat requirements in a way that modifies sanctuary or refuge management practices; and any other adverse impacts discussed in Subparts C, D, or F as they relate to a particular sanctuary or refuge.

Sections 4.7, “Aquatic Resources”; 4.8, “Terrestrial Resources”; and 4.15, “Recreation Resources” of the Draft EIS describe the potential effects of the proposed Project on sanctuaries and refuges in the study area. The impact analyses in the Draft EIS will be incorporated into this document after the public has had an opportunity to comment on the Draft EIS and the USACE has published the Final EIS.

10.2 Wetlands (40 CFR 230.41)

Wetlands are defined as:

> *…Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions…*
> (33 CFR 328.3[b]).

Section 3.6, “Wetlands and Other Waters of the United States” of the Draft EIS describes wetlands present in the study area.

The proposed Project is located within the Lynches River watershed. The upper west portion of the site drains primarily through Camp Branch Creek, which flows from the northwest portion of the site to the confluence of the Little Lynches River located approximately 2 miles southwest. The Little Lynches

River borders the south portion of the site from the west side of US Highway 601 and flows to the southeast. The central portion of the site drains primarily through Haile Gold Mine Creek, which flows southwest from the northeast into the Little Lynches River. Several unnamed tributaries in the study area drain directly to the Little Lynches River.

All of the wetlands and streams in the study area and surrounding watersheds are considered headwater systems, which are often small with minimal flow, yet critical to the health of the entire river network and downstream communities. Headwater streams are the beginnings of rivers, the uppermost streams in the river network farthest from the river's endpoint or confluence with another stream. Headwater streams trap floodwaters; filter pollutants and recycle potentially harmful nutrients; provide fish and wildlife habitat; and sustain the health of downstream rivers, lakes, and bays. These streams also play a critical role in maintaining the quality and supply of drinking water, ensure a continual flow of water to surface waters, and help recharge underground aquifers. Within the Project boundary, there are 294.1 acres of jurisdictional wetlands, 12.4 acres of jurisdictional impoundments (designated as "Waters of the U.S."), and 31.25 acres of streams (100,279.2 linear feet—also designated as Waters of the U.S). These resources are described in Section 3.6, "Wetlands and Other Waters of the United States" of the Draft EIS.

Potential Impacts

The proposed Project involves both direct and indirect impacts on Waters of the U.S. Direct impacts from excavation and fill activities for construction of pits, OSAs, the TSF, and haul roads would result in a permanent loss of wetlands and streams. The proposed Project also involves mining activities with the potential to adversely affect hydrology, water quality, and thermal regimes in surface water and groundwater resources, resulting in indirect impacts on Waters of the U.S. Groundwater lowering activities are necessary to allow mining of ore resources that occur at depths ranging from 110 to 840 feet below grade. These activities could result in substantial hydrologic drawdown in wetlands and streams in the Project area and study area. Surface water hydrology in wetlands and streams could be adversely affected by pit dewatering and direct mining activities; a large portion of the contributing watershed could be removed, resulting in reduced flows and altered hydrologic regimes. The lowered groundwater and surface water alterations also could result in water quality and thermal changes with the potential to cause indirect impacts on the surrounding wetlands and streams and the aquatic resources using those habitats. Furthermore, indirect impacts could occur in the upstream and downstream portions of the stream corridors as a result of habitat fragmentation from the direct mine footprint.

Section 4.6, "Wetlands and Other Waters of the United States" of the Draft EIS discusses the potential impacts on wetlands. The impact analyses in the Draft EIS will be incorporated into this document after the public has had an opportunity to comment on the Draft EIS and the USACE has published the Final EIS.

10.3 Mudflats (40 CFR 230.42)

Mudflats are broad, flat areas along the sea coast and in coastal rivers to the head of tidal influence and in inland lakes, ponds, and riverine systems. There are no mudflats in the Project area or study area.

Vegetated Shallows (40 CFR 230.43)

Vegetated shallows are permanently inundated areas that under normal circumstances support communities of rooted aquatic vegetation, such as turtle grass and eelgrass in estuarine or marine systems, as well as a number of freshwater species in rivers and lakes.

No formal surveys have been conducted for periphyton or aquatic plants, although observations were noted during surveys conducted for other species. Freshwater vegetated shallows in the study area include algal mats, red-brown algae, green filamentous algae, dark red/brown periphyton, cattails (*Typha* sp.), sedges (*Carex spp*.), rushes (*Juncus* spp.), eel grass (*Vallisneria* sp.), American burr-reed (*Sparganium americanum*), and Asian spiderwort (*Murdannia kiesak*) (Rohde 2008, ETT 1991 through 2011, ARCADIS 2012b). All observed species were considered common or, in the case of the Asian spiderwort, an introduced species. The main reason for little periphyton cover or algae presence is the moderate to dense canopy cover encountered at most of the surveyed stream reaches, along with the tannic waters and moderate flow.

Potential Impacts

Direct impacts from excavation and fill activities for construction of pits, OSAs, the TSF, and haul roads would result in a permanent loss of wetlands and streams, with associated loss of vegetated shallows in these areas. The proposed Project also involves mining activities with the potential to adversely affect hydrology, water quality, and thermal regimes in surface water and groundwater resources, resulting in indirect impacts on vegetated shallows. Groundwater lowering activities could result in substantial hydrologic drawdown in wetlands and streams in the study area and study area. Surface water hydrology in wetlands and streams could be adversely affected by groundwater lowering and direct mining activities; a large portion of the contributing watershed could be removed, resulting in reduced flows and altered hydrologic regimes. The groundwater lowering and surface water alterations also could result in water quality and thermal changes with the potential to cause indirect impacts on the aquatic vegetation present those habitats. Furthermore, indirect impacts could occur in the vegetated shallows upstream and downstream of the stream corridors as a result of habitat fragmentation from the direct mine footprint.

Section 4.7, "Aquatic Resources" of the Draft EIS discusses the potential impacts on aquatic vegetation under all Draft EIS alternatives. The impact analyses in the Draft EIS will be incorporated into this document after the public has had an opportunity to comment on the Draft EIS and the USACE has published the Final EIS.

10.4 Coral Reefs (40 CFR 230.44)

Coral reefs consist of the skeletal deposit of invertebrate organisms present in growing portions of a reef. There are no coral reefs in the study area.

10.5 Riffle and Pool Complexes (40 CFR 230.45)

Riffle and pool complexes exist along steep gradient sections of streams where the rapid movement of water over a course substrate in riffles results in rough flow, a turbulent surface, and high DO levels. Riffles are intermixed with pools, which are characterized by slower stream velocity, smooth surface, and a finer substrate. Riffle and pool complexes are particularly valuable habitat for fish and wildlife. Areas along headwater streams within the study area have sufficient grade, flow, and cobble and gravel substrate to produce riffle and pool complexes. Sections 3.4, "Surface Water Hydrology and Water Quality" and 3.6, "Wetlands and Other Waters of the United States" of the Draft EIS describe the characteristics of the streams in the study area.

Potential Impacts

Rifle and pool complexes in the study area may be directly and indirectly affected by Project activities. Direct impacts from excavation and fill activities for construction of pits, OSAs, the TSF, and haul roads would result in a permanent loss of streams. The proposed Project also involves mining activities with the potential to adversely affect hydrology, water quality, and thermal regimes in riffle and pool complexes, resulting in indirect impacts on Waters of the U.S.

Sections 4.4, "Surface Water Hydrology and Water Quality" and 4.6, "Wetlands and Other Waters of the United States" of the Draft EIS discuss the potential impacts on wetlands. The impact analyses in the Draft EIS will be incorporated into this document after the public has had an opportunity to comment on the Draft EIS and the USACE has published the Final EIS.

11. SUBPART F: POTENTIAL EFFECTS ON HUMAN USE CHARACTERISTICS

11.1 Municipal and Private Water Supplies (40 CFR 230.50)

Surface water and groundwater resources may be used for agricultural, domestic, industrial and commercial, and public water supply uses downstream of and adjacent to the Project area. No permitted surface water withdrawals are known to be located within the study area. Three intakes were identified downstream of the study area, but within the greater Pee Dee River watershed on the Waccamaw River, Pee Dee River, and Black Creek—all of these intakes are downstream of, and fed by, the Lynches River (SCDHEC 2012b, 2012c). While there are no known stream or river withdrawals within the vicinity of the Project, ponds and springs in the study area are used for water supply purposes, mainly at farms. The *Water Resources Inventory: Haile Gold Mine – Wells, Springs, and Ponds* (Kennedy Consulting Services 2013) identified 12 ponds and six springs within 2 miles of the Project that are currently, or were previously, used for water supply purposes or other beneficial uses.

The majority of the groundwater withdrawn in the groundwater supply study area is withdrawn from the saprolite and bedrock units (SCDNR 2012a). These are generally low-yielding units within the study area but are the only source of water supplies to many of the self-supplied water users in the study area. The Coastal Plains Sands unit also produces usable quantities of groundwater but is discontinuous within the study area and is generally less than 50 feet thick where present (Schlumberger Water Services 2010). There are 237 groundwater wells in the study area.

Section 3.5, “Water Supply and Floodplains” of the Draft EIS describes municipal and private water supplies in the study area. Other portions of the Draft EIS describe closely related resources (Sections 3.3, “Groundwater Hydrology and Water Quality” and 3.4, “Surface Water Hydrology and Water Quality) and physical and biological assemblages of surface waters in the study area (Sections 3.6, “Wetlands and Other Waters of the United States” and 3.7, “Aquatic Resources”).

Potential Impacts

Proposed Project operations include depressurizing the aquifer—lowering the aquifer level by withdrawing groundwater—to dewater the mine pits in order to extract gold and silver ore. Water produced from dewatering the mine pits, treated ore processing water, and stormwater would be released to surface waters within the Project boundary. The proposed withdrawal of groundwater, alterations in the watershed that may affect runoff rates and volumes, and releases from regulated stormwater discharges may affect water supplies in the study area.

Potential direct and indirect impacts on water supply and floodplain management associated with the Project include the following:

- A lowered groundwater table associated with the dewatering in the Project area could affect the well yields of surrounding groundwater users;
- Changes in surface water flow could affect the availability of water for downstream surface water users; and
- Changes in surface water flow could affect runoff and high flows.

Section 4.5, "Water Supply and Floodplains" of the Draft EIS addresses the Project-related impacts on water supply that are associated with these concerns. Other Project-related changes that may occur to surface water and groundwater resources are described in Sections 4.3, "Groundwater Hydrology and Water Quality"; 4.4, "Surface Water Hydrology and Water Quality"; 4.6, "Wetlands and Other Waters of the United States"; and 4.7, "Aquatic Resources" of the Draft EIS. The impact analyses in the Draft EIS will be incorporated into this document after the public has had an opportunity to comment on the Draft EIS and the USACE has published the Final EIS.

11.2 Recreational Fishing (40 CFR 230.51) and Water-Related Recreation (40 CFR 230.52)

There is no existing public recreation access to the Project area, and no public recreation areas are located on parcels adjacent to the Project. The 45,348-acre Carolina Sandhills NWR is located approximately 10 miles east of the Project in Chesterfield County, South Carolina. Primary water-related recreational opportunities include wildlife viewing, fishing, and hunting **(**USFWS 2010). The Sandhills State Forest, comprised of a 46,838-acre tract in Chesterfield and Darlington Counties, is located directly southeast of the NWR. This area also provides wildlife viewing, fishing, and hunting opportunities (SCDNR 2012b).

Thirteen parks managed by Lancaster County are within approximately 5 miles of the Project boundary. In addition, 17 county-managed parks in the Lancaster area are located approximately 15 miles northwest of the Project area. These recreation areas provide a variety of recreation facilities and opportunities, including boat launch areas. Section 3.15, "Recreation Resources" of the Draft EIS describes water-related recreation resources in the study area.

Potential Impacts

Potential issues that could affect water-related recreational experiences include changes to the recreational setting and experience caused by Project-related noise or visual changes; impaired access to recreational areas; degraded recreational wildlife viewing, fishing, hunting, and boating opportunities; and conflicts with adopted recreation plans or policies.

Section 4.15, "Recreation Resources" of the Draft EIS describes the potential effects of the proposed Project on recreation resources within the study area. The impact analyses in the Draft EIS will be incorporated into this document after the public has had an opportunity to comment on the Draft EIS and the USACE has published the Final EIS.

11.3 Aesthetics (40 CFR 230.53)

Aesthetics associated with the environment consist of the perception of visual resources, including the natural and manmade features of an area such as landforms, vegetation, water surfaces, and cultural modifications that give a particular landscape its character and aesthetic quality. The study area for visual resources and aesthetics is defined as the area within the Project boundary, adjacent parcels, and viewing areas from where Project-related features and construction, operation, and maintenance activities have the potential to be visible.

Section 3.14, "Visual Resources and Aesthetics" of the Draft EIS describes the visual resources in the study area. The visual character of the study area is primarily rural; agricultural and forested lands are interspersed with wetlands, streams, and ponds. The topography within and adjacent to the Project site includes areas of predominantly rolling terrain with moderate elevation changes and other areas with steeper hills and valleys. Some of these topographic features are a result of previous mining activities.

The landscape character is comprised of generally five types of landscape units: forested landscape, open shrub/scrub area, residential, commercial/industrial, and mining. A few residential areas and a commercial/industrial area are adjacent to the Project boundary.

Potential Impacts

Construction activities and mining operations at Haile Gold Mine have the potential to affect the visual character of the study area in the short term during construction and operation, and in the long term after reclamation. Activities that would affect the visual character include pit excavation, overburden storage, and other changes to topography. In addition, Project structures, lighting, and vehicular traffic can affect visual resources. The magnitude of impacts on visual resources are influenced by the scale and location of the modifications (e.g., the amount of acreage cleared of vegetation); potential screening or visual obstructions (e.g., vegetation and topography); and proximity of key viewing areas, sensitive features, and public access features (e.g., parks, historic sites, and transportation corridors) to the Project site.

Section 4.14, "Visual Resources and Aesthetics" of the Draft EIS describes the potential effects of the Project on visual resources and aesthetics. Appendix N of the Draft EIS provides further discussion of the methods associated with the visual resources impact assessment, in particular the identification of key viewing areas. The impact analyses in the Draft EIS will be incorporated into this document after the public has had an opportunity to comment on the Draft EIS and the USACE has published the Final EIS.

11.4 Parks, National and Historical Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves (40 CFR 230.54)

Parks, national and historic monuments, national seashores, wilderness areas, research sites, and similar preserves consist of areas designated under federal or state laws or local ordinances to be managed for their aesthetic, educational, historical, recreational, or scientific value. Section 3.15, "Recreation Resources" of the Draft EIS describes parks and preserves in the study area. Cultural resources, such as pre-historic and historic sites, also exist in the Project area. A total of 332 cultural resources were identified in the Cultural Resources Study Area, including archaeological sites, structures, and cemeteries. Cultural resources in the Project area are discussed in Section 3.13, "Cultural Resources" of the Draft EIS.

The Forty Acre Rock Heritage Preserve and WMA, located approximately 1 mile north of the northern tip of the Project area, is managed by the SCDNR and is designated as a National Natural Landmark (SCDNR 2007). The 2,267-acre Forty Acre Rock Heritage Preserve is popular for hiking and nature viewing. Hunting is permitted on parts of the preserve. The preserve provides protection for nearly a dozen rare, threatened, or endangered plant and wildlife species, and is known as one of the best birding and wildflower locations in South Carolina. The preserve's maintained trail system includes foot bridges and boardwalks (WildlifeSouth 2012).

The 45,348-acre Carolina Sandhills NWR is located approximately 10 miles east of the Project in Chesterfield County, South Carolina. The primary purpose of the NWR is conservation of natural resources and habitats, and preservation of endangered and threatened species. The NWR is primarily forested woodlands, with some fields and open spaces, and receives 50,000–60,000 visitors annually. Primary recreational opportunities include an auto tour route, hiking, wildlife observation, fishing, and hunting **(**USFWS 2010). The *Carolina Sandhills National Wildlife Refuge Comprehensive Management Plan* outlines management programs, objectives, and corresponding resource needs for a 15-year period—

with the goal of optimizing refuge operations by balancing enhanced habitat and fish and wildlife population management, and wildlife-dependent public uses (USFWS 2010).

The Sandhills State Forest, comprised of a 46,838-acre tract in Chesterfield and Darlington Counties, is located directly southeast of the NWR and is managed by the SCDNR. Sugar Loaf Mountain Recreation Area, located within the Sandhills State Forest, is one of the most popular equestrian recreation areas in the region. This area provides hunting, hiking, horseback riding, biking, boating, fishing, picnicking, and camping opportunities (SCDNR 2012b).

Thirteen parks managed by Lancaster County are within approximately 5 miles of the Project area. The Kershaw area facilities are located approximately 3 miles southwest, the Flat Creek area facilities are located approximately 2 miles north, and the Heath Springs area facilities are located approximately 5 miles west of the Project (Lancaster County 2010). In addition, 17 county-managed parks in the Lancaster area are located approximately 15 miles northwest of the Project area. These parks range in size from less than 1 acre to the 65-acre Springdale Recreation Complex in Lancaster. These recreation areas provide a variety of recreation facilities and opportunities, including multi-use fields, picnic areas, hiking trails, boat launch areas, and playground facilities.

Potential Impacts

Potential issues that could affect parks and preserves would include changes to the recreational setting and experience caused by Project-related noise or visual changes; impaired access to recreational areas; degraded recreational wildlife viewing, fishing, hunting and boating opportunities; and conflicts with adopted park and preserve plans or policies.

The analysis of impacts on parks, preserves, monuments, and other sites of importance in the Draft EIS include consideration of potential modification of the aesthetic, educational, historical, recreational, and/or scientific qualities thereby reducing or eliminating the uses for which such sites are set aside and managed. Historic sites require assessment of the introduction of visual, audible, or atmospheric elements that are out of character with the historic property or that alter its setting.

Sections 4.13, “Cultural Resources” and 4.15, “Recreation Resources” of the Draft EIS describe the potential effects of the proposed Project on cultural resources, parks, and preserves in the study area. The impact analyses in the Draft EIS will be incorporated into this document after the public has had an opportunity to comment on the Draft EIS and the USACE has published the Final EIS.

12. SUBPART G: EVALUATION OF DREDGED OR FILL MATERIAL (40 CFR 230.60)

The purpose of the evaluation procedures and chemical and biological testing sequence outlined in this section is to provide the information needed to support the factual determinations required by "Proposed Disposal Site Determination."

To determine whether additional chemical or biological testing is required, the USACE must consider available information regarding the proposed dredged and fill material, including prior evaluations, chemical and biological tests, scientific research, and past experience. The Guidelines outline the decision-making procedure for this determination, which includes the following tests:

- If the evaluation under Section B of Subpart G indicates that the dredged and fill material is not a carrier of contaminants, the required determination pertaining to the presence and effects can be made without testing. Dredged or fill material is most likely to be free from chemical, biological, or other pollutants where it is composed primarily of sand, gravel, or other naturally occurring inert material.
- The extraction site shall be examined in order to assess whether it is sufficiently removed from sources of pollution to provide reasonable assurance that the proposed discharge material is not a carrier of contaminants. Factors to be considered include, but are not limited to:
    - Potential routes of contaminants or contaminated sediments to the extraction site, based on maps, aerial photography, or other materials that show watercourses, surface relief, proximity to tidal movement, private and public roads, location of buildings, municipal and industrial areas, and agricultural or forest lands.
    - Pertinent results from tests previously carried out on the material at the extraction site, or carried out on similar material for other permitted projects in the vicinity. Materials shall be considered similar if the sources of contamination, the physical configuration of the sites and the sediment composition of the materials are comparable. Tests from other sites may be relied on only if no changes have occurred at the extraction sites to render the results irrelevant.
    - Any potential for significant introduction of persistent pesticides from land runoff or percolation.
    - Any records of spills or disposal of petroleum products or substances designated as hazardous under Section 311 of the CWA (see 40 CFR 116).
    - Information in federal, state, and local records indicating significant introduction of pollutants from industries, municipalities, or other sources, including the types and amounts of waste materials discharged along the potential routes of contaminants to the extraction site.
    - Any possibility of the presence of substantial natural deposits of minerals or other substances that could be released to the aquatic environment in harmful quantities by human-induced discharge activities.
- Where the discharge site is adjacent to the extraction site and subject to the same sources of contaminants, and the materials at the two sites are substantially similar, the fact that the material to be discharged may be a carrier of contaminants is not likely to result in degradation of the disposal site. In such circumstances, when dissolved material and suspended particulates can be controlled to prevent carrying pollutants to less contaminated areas, testing will not be required.
- Even if the above tests lead to the conclusion that there is a high probability that the material proposed for discharge is a carrier of contaminants, testing may not be necessary if constraints are

> available to reduce the contamination to acceptable levels within the disposal site and to prevent contaminants from being transported beyond the boundaries of the disposal site. In this case, constraints must be acceptable to the permitting authority, and the potential discharger must be willing and able to implement such constraints. However, even if tests are not performed, the permitting authority must still determine the probable impact of the operation on the receiving aquatic ecosystem. Any decision not to test must be explained in the Factual Determinations.

If, upon evaluation of the proposed dredge or fill material, the USACE determines that additional chemical, biological, and physical testing is required, testing guidelines are outlined under Section 230.61 of the Guidelines. If additional testing is not required, the USACE may use the information outlined above in making the factual determination required in Subpart B "Proposed Disposal Site Determination."

13. SUBPART H: ACTIONS TO MINIMIZE ADVERSE EFFECTS

Minimization includes actions that can be undertaken by the Applicant to minimize the adverse effects of discharges of dredged and fill material. Minimization measures are incorporated into the USACE's evaluation of the proposed Project under the Factual Determinations (Subpart B) and technical evaluation factors (Subparts C through F) as they have the potential to lessen adverse effects on Waters of the U.S. and aquatic ecosystems. Minimization measures include, but are not limited to, actions concerning the location of the discharge; actions concerning the material to be discharged; actions controlling the material after discharge; actions affecting the method of dispersion; actions related to technology; actions affecting plant and animal populations; actions affecting human use; and other actions. Examples of each of these action types are discussed below.

The Applicant has identified several potential measures to minimize adverse impacts. These measures are outlined in the Applicant's revised DA permit application (Haile 2012b), Monitoring and Management Plan (Haile 2013a), Compensatory Mitigation Plan (Haile 2013b), and Reclamation Plan (Haile 2013c). Applicant-proposed minimization measures are summarized in Chapter 6, "Mitigation and Monitoring" in the Draft EIS. Resource-specific measures are identified in the respective sections of Chapter 4, "Environmental Consequences" in the Draft EIS. The above-referenced documents also are provided as appendices to the Draft EIS (available at: www.hailegoldmineeis.com).

Minimization measures in the revised Project mine plan included redesign and relocation of three OSAs and the Mill Site, realignment of the TSF haul road and service roads, relocation of the Project entrance road, redesign of the Holly and Hock TSF borrow areas, and redesign of the Haile Gold Mine Creek detention and diversion structure to minimize impacts due to inundation.

The USACE has reviewed the minimization measures proposed by the Applicant and considers them to be a reasonable starting point for developing the full list of all appropriate and practicable steps that can be taken to minimize the potential adverse impacts of the proposed Project. However, the USACE has not yet determined whether the Applicant's proposed minimization actions include all appropriate and practicable measures and has not yet determined whether the Applicant's proposed Project complies with the test of minimization of potential adverse impacts. This determination will be included in this document after the public has had an opportunity to comment on the Draft EIS and the USACE has published the Final EIS. The USACE invites the public to comment on the current list of Applicant-proposed minimization measures and to provide suggestions on additional minimization measures that may be practicable and appropriate to help reduce impacts on waters of the U.S. and aquatic ecosystems. A general list of minimization measures have been grouped by type and are listed below. The list is not exhaustive, but provides a starting point for consideration of the types of minimization measures that may be available to lessen potential impacts of the proposed Project.

13.1 Actions Concerning the Location of the Discharge (40 CFR 230.70)

- Concentrate all land disturbances within a relatively compact mine footprint affected area.
- Engineer the pit designs to optimize recovery of reserves and minimize the amount of overburden/ uneconomical material and associated land disturbance.
- Design and locate mine facilities to avoid Waters of the U.S., where feasible.
- Concentrate and confine impacts to previously disturbed areas, where feasible.

- Avoid mine roads crossing Waters of the U.S. Where crossing is necessary, minimize impacts by crossing at the narrowest portion and/or by siting over existing road crossings.
- Use existing community infrastructure, which avoids need to affect additional lands, to construct employee housing facilities and other amenities.

13.2 Actions Concerning the Material to Be Discharged (40 CFR 230.71)

- Amend Yellow Class overburden material used as pit backfill with lime (or other suitable material) to minimize acid rock drainage during operations.
- Implement an overburden characterization and management plan, including segregating and placing rock based on the content of potentially acid-generating (PAG) minerals.
- Develop detailed pollution prevention plans for process chemical handling and mining operations in accordance with appropriate regulations, permits, best practices, and codes.

13.3 Actions Controlling the Material after Discharge (40 CFR 230.72)

- Perform concurrent and final reclamation to minimize soil loss and erosion.
- Use native seed mixes to promote diverse wildlife in areas undergoing final reclamation.
- Perform reclamation to approximate original topography where practicable.

13.4 Actions Affecting the Method of Dispersion (40 CFR 230.73)

- Use methods of managing sediment and erosion control during construction as presented in the *South Carolina Stormwater Management Handbook* (SDHEC 2005).
- Design facility slopes to minimize erosion, as feasible.

13.5 Actions Related to Technology (40 CFR 230.74)

- Route depressurization water through holding tanks, which will assist in acclimating water to ambient temperature and increasing DO levels prior to release to streams.
- Implement 50-foot vegetative buffers around otherwise non-impacted surface waters.
- Use composite liner (low-permeability soil liner and high density polyethylene [HDPE] liner) at the TSF and Johnny's PAG.
- Install an HDPE cover on TSF and Johnny's PAG during closure to minimize impacts on water quality.
- Install a double HDPE liner at the TSF Underdrain Collection Pond, 465 Collection Pond, 469 Collection Pond, and 19 Pond and install a single HDPE liner at the Process Event Pond.
- Use water-resistant ammonium nitrate emulsion blasting agent to minimize impacts on nearby waterbodies and groundwater.
- Perform employee training.

13.6 Actions Affecting Plant and Animal Populations (40 CFR 230.75)

- Expedite refilling of Ledbetter Pit Lake and actively treat the water to minimize impacts on water quality.
- Re-establish streams diverted during operations over backfilled pits.
- Re-establish Haile Gold Mine Creek through Ledbetter Pit Lake.
- Design and operate contact and process water ponds to restrict access, where necessary, and to provide a means of escape for trapped animals.
- Design storm ponds to allow animals a means of escape.
- Implement a Wetland Monitoring Plan during operations.
- Perform aquatic surveys, in accordance with the National Pollutant Discharge Elimination System (NPDES) permit.
- Monitor wildlife at all open retention structures.
- Inspect and maintain all fencing around HDPE double-lined ponds and the TSF perimeter regularly.
- Implement an avian mortality reporting system.
- During final grading of facilities during reclamation, occasional large boulders that are uncovered during sloping may be left on the surface to provide microhabitats for wildlife and vegetation.

13.7 Actions Affecting Human Use (40 CFR 230.76)

- Divert streams around disturbance areas during operations.
- Design culverts to maintain existing surface drainage patterns and prevent erosion.
- Return disturbed areas to a stable condition that can support a productive post-mining land use.
- Use visual screening techniques.

13.8 Other Actions (40 CFR 230.77)

- Treat runoff and seepage from Johnny's PAG and other contact waters during operations in an NPDES-permitted treatment system prior to release.
- Treat draindown from Johnny's PAG and the TSF during closure in an NPDES-permitted treatment system prior to release.

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